PC PILOT

The Magazine for Flight Simulation in association with www.simflight.com

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Editor's Letter

Welcome to the fourth issue of PC Pilot.

What does the future hold for flight simulation? Technology has always fueled developers' creativity. From the days of the ZX81 to the Commodore Amiga computer and the new 1 GHz PCs of today, flight simulation seems to have progressed steadily year on year.

However creativity seems to be slowly dying. Flight Simulator 2000 has disappointed many. Some smaller simulation companies are struggling and many larger ones are pulling out of the market altogether. With fewer companies in the market providing true competition there will be less pressure on those that remain to push the creative and technological boundaries as hard as in years past.

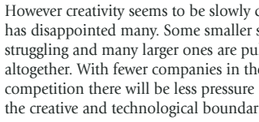
Microsoft, back in the early 80's, seemed to be in touch with the process of making technology work by having a product nobody else thought of and building on it. They developed an operating system that made PCs appeal to the masses and had the simple mission of "a computer on every desk". A simple dream that was mocked by some at the time, but one we now understand is becoming a reality. In many ways that same ethos has helped develop flight simulation into a hobby that provides almost unbelievable levels of realism and hundreds of hours of enjoyment. All for less than the cost of a family trip to the cinema.

However, what mission does Microsoft hold for flight simulation now? If a company has established a seemingly unstoppable brand as with Flight Simulator it could, intentionally or not, hold other companies back whilst at the same time choking the very thing that technology desperately needs - creativity. While it is easy to point the finger of blame to the faceless corporation, it is ourselves who feed this potential downward spiral.

It is only natural to buy a name and product we know rather than try something new. Fly! and Flight Unlimited III have tried to genuinely offer improvements in simulation yet they have sold a minuscule fraction of Flight Simulator 2000's sales. More complex programs such as 747 PS1, Airline Simulator 2 and X-Plane have fared even worse, even when one considers their specialist approach and higher price tag. Some of these other simulations might seem more expensive and complex to get to grips with, but do offer something genuinely new to the simmer. In some ways we are all guilty of selling our simmer souls to the devil we know - even if we moan about it afterwards!

As always, it seems that it is the smaller companies, or even talented individuals producing freeware and shareware, that are really the innovators. With the 'it will do' mentality and the additional pressure of Lara Croft-type games pushing our hobby to one side (see 'Opinion' this issue) it seems that the future of flight simulation might be bleak. Let's hope creativity wins through.

Happy Flying...



Mike Clark
Editor
mike@pcpilot.net

The Crew

Mike Clark
Mike has been a journalist for 15 years with a background in PR and marketing. Mike became hooked on Flight Simulator in 1995 and in 1997 started work on a free e-mail flight simulation newsletter called TheMag. Since then TheMag has grown to a regular circulation of over 70,000! Mike has written many reviews and interviewed some of the biggest names in flight simulation and real aviation. Mike's style is to tell how it is and has made PC Pilot's mission to present, inform and advise readers on all computer flight simulation related issues.

Greg Gott
Greg has held a private pilot's licence for 11 years and enjoys cruising around the New England countryside in Skyhawks and Archers. Greg is a genius with hardware and knows many different types of system… being one of the first "overclockers". Some of his much-praised articles can be found at www.simflight.com.

Mike Hambly
Mike Hambly, retired Royal Air Force, veteran, is widely known for his freeware and and payware product sound sets. His interest in aviation began long before joining the Royal Air Force back in 1964. As a young man he used to frequent the airfield at RAF St. Mawgan to see the Shackletons and Neptune's of this very busy Coastal Command station. Mike also served in Germany, Cyprus, and Aden. He saw a great many changes in aircraft types from the days of the Vampire through to the Harrier and Nimrod. He began developing his own sounds for flight sim as a hobby now is recognised as one of the world's top sound designers.

Stephen Heyworth
Steve has been a qualified Pilot since 1984. He has flown many planes from the Piper and Cessna stables as well as more entertaining planes like the Tiger Moth, Chipmunk, Bulldog and Slingsby. He is licensed to fly by day, night and instruments. Steve has also written his own flight simulator using C++/DirectX and therefore has a good understanding of how flight simulators are programmed and work.

Joe Lavery
Joe has been a flight simulator enthusiast since the BBC Micro days and became interested enough to complete a Private Pilots course in 1996. He began his writing career covering mainly graphics and CAD reviews due to his background in this area but more recently has hosted a flight simulator column covering all aspects of simulated flight.

Bill Stack
Bill Stack has written numerous books and articles about business, management and marketing and has trained thousands of business and government professionals. With his flight simulation books, he applies his training background to help fellow flight simmers reach their greatest potential in flight skills.

Kenji Takeda
Kenji is an experienced computer journalist who has worked for such magazines as PC Gaming World, Computer Life and PC Review and is also a contributor to Gamespot UK. He holds a Master of Engineering degree in Aeronautics and Astronautics, a PhD in Aerodynamics and is a professional member of the American Institute of Aeronautics and Astronautics (www.aiaa.org). When he's not flying for PC Pilot, he is busy performing research in aeroacoustics, developing techniques to model aerodynamic noise and finding ways of reducing it to help make our airports quieter in the future.

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Downloads – Love them or hate them?

FROM: George Timms

"Having obtained my PPL Helicopter licence a number of years ago, I had an obvious interest in the type, but was very disappointed with the difficult and uncharacteristic handling of the offerings in simulation. So not expecting much I downloaded the Bell 47G by Monte Caudill, as recommended in your last issue.

If there is a word that surpasses 'excellent' this helicopter has it! I find it so lifelike with my simple set-up, that only my lack of a collective lever lets me know I am not flying a real machine. PC Pilot you're the greatest!"

FROM: J. Pope (Disillusioned)

"I wish I had not seen the article on downloads from the Internet… If I had known the hassle involved I would never have gone into it. If not an expert, people would be well advised to stay well clear of that side of flight simulators. For a novice it is a direct route to frustration. Never again. I will go back to ordering add-on products on CDs direct from the suppliers.

As a novice I am unable to install downloaded files onto FS2000. Is there an experienced simmer out there living near to Staines in Middlesex who would be prepared to help? If so please contact jerry@ferndale7.freeserve.co.uk"

FROM: Chris Grady

Website: www.thehighlife.co.uk

"The High Life is a modern approach to Aviation. It has a major section of hosted flight sim files for everyone to download and enjoy. Every week new files are added by the public, many of which are high quality, and all files are checked for viruses before being uploaded. If you want to download or you want the site to host your flight sim files then go for The High Life."

We reply:

Thanks for all the comments we have had on this subject. It seems you either love downloads or hate them! We will try and cover the basics again – focusing on how to get the files in the right place to use and enjoy.

COMMS

A grateful simmer writes

FROM: Eric Jelley

"I am writing to say how very grateful I am to you for publishing my letter in the February issue of PC Pilot, As a result I have had a large number of e-mails offering moral support, useful advice, and in several cases from people who live relatively close offers of practical instruction! I am now being instructed by a retired teacher who also happens to have been a Fleet Air Arm navigator. He is giving me 'hands on' instruction. Having had the first lesson, I can now take-off staying on the runway and flying straight and level. Lesson two is due this week. My instructor has also recently qualified for his Private Pilots Licence and has offered to take me up!
I really am most grateful to all concerned; what a wonderful bunch of chaps these Flight Simmers are!"

We reply:

We couldn't agree more. Thanks to all those who have offered Eric help.

A reader recommends…

FROM: Dave Green

"Some of your readers may like to know about the online version of the CAA AIP. The most useful sections to me are the Aerodrome charts, SIDs and STARs for all UK airports, and the En-route supplement. The aerodrome charts and airfield information are very useful for designing scenery in flight simulators. The URL is www.ais.org.uk/uk_aip/html/homepage.htm
Another item of interest is the forthcoming CD-ROM from VFR Scenery Ltd. See www.vfrscenery.com for screenshots and more info."

We reply:

More than happy to pass this information on. The information available on the AIS site is amazing! We're also aware of the VFR Scenery project and pleased to point this out to readers, though VFR Scenery's original publishing deal with Papa Tango has apparently collapsed – so the future is unclear at the moment.

Cockpit Building

FROM: Michael Parker

"I found some very useful companies for cockpit building. The first company which could you please mention in the magazine is CSI Cockpit Simulations - www.em.ca/~cockpits They are based in the US, and they specialize in panels for Boeings and Airbuses. They also provide all the switches. They were very helpful, and explained how to start off building a cockpit. They said you need something called an Epic. This is programmable for 300 switches or more. Only one company in Europe sells this and it's Micro cockpits - www.fsim.com Nobody from the States is allowed to sell one of these to someone within Europe, so I've been told. Anyway hope this information was useful and please mention CSI Cockpit Simulations as they were a great help!"

We reply:

Michael, this is excellent information and something that will help potential constructors get started on the long road to building their own realistic cockpit. Thanks for the information.

FS2000 Frame Rates Table

FROM: Stuart J Hirst PhD

"In Issue 2, in the FS2000 review, you provide a table from 'simflight.com' showing expected frame rates with different graphic cards on a range of PCs. Can you tell me where on the simflight.com website you found this info? I've looked several times without success. I want upgrade to a PIII 700Mhz PC and this information would be very useful."

We reply:

We have had several requests for this information. It can be found at the following web address: http://fs2000.simflight.com/fps/

Readers Request

FROM: Arthur Jennings

"I fly a lot of big commercial jets in the FS2000 and I love GPS Panels. Can you please give me a step-by-step plan to changing panels in my favorite jets so I will have GPS. Please make it a easy step by step as I have been instructed before but nothing is working out."

We reply:

Hi Arthur. We are looking at putting together a tutorial not only for panel installation but also, aircraft, scenery and utilities. You can expect to see this in a future issue.

Only partially clear

FROM: Paul Ponchard

"I read the Product Listings for the compatibility of various add-ons in Flight Simulator 2000, as I have various add-ons and was wondering if these would work. Could you explain what you mean by the term 'partial' in the compatibility section? I am sure I am not the only person in this position."

We reply:

The listings are supplied by RC Simulations and the recommendations on compatibility are based on their extensive experience and customer feedback. By 'partial' we mean that some aspects of that product will not function correctly in FS2000. For example with an aircraft add-on, some aircraft may not work at all or may not display correctly. For items such as utilities it means that some features may not be available in FS2000. Where we have indicated 'partial' we do imply that the product in question should function to a reasonable degree, but certainly not fully. It is hard to give a general answer to an issue that has so many different results with different products. As we say – if in any doubt, contact the publisher or developer to get the answers to your questions!

Ooops – we're sorry!

FROM: John King

Have just received my first copy of "PC Pilot" (Issue 3) and congratulate you on a fine magazine. As a retired professional pilot (and ardent Flight Simmer - ATP, AS, AS2 & PS1) I read it from front to back and enjoyed the articles very much.

However, I couldn't help noticing the error in Bill Stack's IFR Tutorial. He states that the climb requirement for the CPT 1R EGSS SID is not less than 310 fpm. In fact the SID calls for 310 Feet Per N.M. This is very different from fpm. Thus one must read the required ROC in fpm off the table against the relevant G/S. As an example, the 310 ft per nm climb requirement will need a ROC of not less than 510 fpm with a GS of 100 Kts. It just shows how carefully one has to read (and understand) SIDs and STARs in order not to fall into a trap!

Bill Stack replies:

We gave the initial climb rate as 'no less than 310 feet per minute', whereas we should have stated 'no less than 316 feet per nautical mile'. A conversion table on the chart shows that this minimum climb gradient can be achieved at a ground speed of 75 to 100 knots by climbing at no less than 395 feet per minute. We apologise for any inconvenience caused by our error.

Foolish Flight of Fancy?

FROM: Mike Mackenzie

I just ordered PC Pilot (Issue 3) and boy what a scorcher of a mag! It blew my socks literally right off! I thought the article by the Japanese professor chap about Southampton was tops. In our local pub, the Henry II, Frinton-on-Sea, us flight simmers have clubbed together for a mini- multi-monitor system. I been told that Greene King, the local brewers, are offering partial support for in-pub interactive flying and we aim to be the first pub in East Anglia truly wired for flight. We are having a 'fly-in' where we will fly London to Johannesburg direct and see how many pints we can drink in the process. I reckon this will be at the end of this month and wondered if PC Pilot want to cover it?

We reply:

Sounds great Mike, you really know how to push the envelope out there on the East coast! We will try our best to get down there for the take-off. How many pints do you intend to drink? Is it for charity? By the way our resident Japanese chappie has asked you not to be so Saki. ■

Is Wings Over China crashing your way?

FROM: Ian Taylor

"Issue 3 of PC Pilot crash landed through my letter box this morning, with charts as well, it's like Christmas again! Thanks.

I felt I should send a warning to you about 'Wings over China'. I have a Pentium III 500 with 128Mb RAM and Voodoo3 3000 and successfully installed Combat Flight Simulator and Missions and all was working well so I decided to treat myself to Pacific Combat Pilot - Banzai! Well, that certainly spiced things up. Then I saw Wings over China, bought it, installed it and tried it.

Black screen - system totally frozen and did not do anything even when left alone for an hour. Switched off, started again, blue scan disc screen etc. same result. Tried again through Combat Flight Simulator and even a standard Microsoft Mission froze up on the 'please wait while the mission loads screen'.

So I spent a whole Sunday afternoon un-installing CFS, defragmenting the system and re-installing CFS with all the extra Missions and Pacific Combat Pilot - Banzai! All is now as it was before the dreaded Wings over China. So beware."

We reply:

It would appear that you have experienced the same problem that a small minority have also suffered. This appears to be a localized problem depending on your system and software setup. As always, we recommend you contact the manufacturer or publisher direct, in this case you can contact Abacus online at http://www.abacuspub.com/contact.htm

COMPETITION WINNERS

Obviously many of you either found the questions too difficult or were too lazy to enter as we had relatively few entrants to last issue's competition. Up for grabs were some terrific prizes. The winners are:

First - David Spencer from Stroud in Gloucestershire, who will shortly be the proud owner of a CH Yoke LE and Pro Pedals combo.

Runners Up - David Cheetham from Brighton, Patrick Wadsworth from Sandhurst and Mr. E Tippelt from Leatherhead. They will receive the F-16 Combatstick, Gamestick 3D and CH Gamepad respectively.

Congratulations to all!

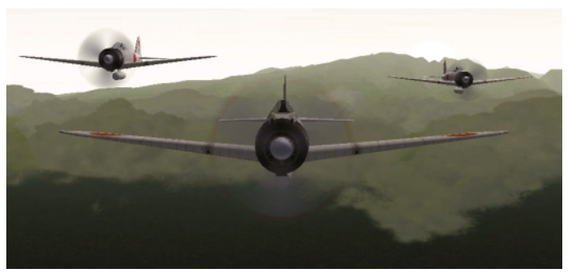
COMBAT FLIGHT SIMULATOR IN THE PACIFIC

Designed by the same team that created Flight Simulator 2000, Microsoft have announced the release this autumn of 'Combat Flight Simulator: WWII Pacific Theatre' (already being dubbed 'CFS2').

Covering the Pacific Theatre of Operations, CFS2 is expected to incorporate a comprehensive set of extras including new carrier operations, aircraft, missions, scenery, and campaigns. You'll be able to fly over the South Pacific, for either the Japanese or United States Navy in more than 100 different missions.

18 aircraft (of which only 7 are flyable) are planned for inclusion, including the A6M2 Zero, A6M5 Zero, N1K2-J George, Lockheed P-38F Lightning, F4U-1A Corsair, Grumman F4F-4 Wildcat and the Grumman F6F-3 Hellcat.

Other enhancements promised are 3D objects and aircraft models, cockpits, explosions, splashes, waves and wakes, and many other effects. The Flight Simulator 2000 terrain engine has been incorporated into this release (which may or may not be a good thing!). The Microsoft team has also created an editor, which allows users to add small details and improvements to coastline features. Enhanced weather effects, such as clouds, haze, and rain are also planned.



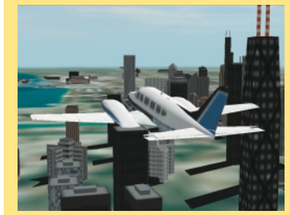
A Graphical Mission Editor has been added to allow users to create and modify missions. This will allow for a full-featured, graphical mission editor and campaign builder — the same tool used by the game's designers to create the battles featured in CFS 2. Add-on developers and enthusiasts will also be able to take advantage of this tool to expand the range of missions to fly in this or the original CFS.

Full Multiplayer Support will be included and Free Internet play for up to eight players on the MSN Gaming Zone, over a LAN, or modem to modem. ■

Website: www.microsoft.com/games/

NEWS

For daily news updates log onto **www.simflight.com**



FLY! 2K – NOW WITH WINGS

Developers of Fly!, Terminal Reality, have announced Fly! 2K, an enhanced version of the general-aviation simulation. Fly! 2K expands on its predecessor by providing the most recent enhancements (we think they mean patches) to the original and a host of new features including the Sky! Environment Exciter, Roger Wilco support for online voice chatting, and an expanded global elevation database. Fly! 2K is expected sometime in April for both PCs and Macintosh computers. In addition, the company will offer free upgrades to current Fly! owners. ■

Web: www.iflytri.com/Fly2K.htm

GRASS SKIRTS IN FS2000

From the maker of Geneva 2000 and Creatools, Christian Fonck of FlightWorld in Geneva has recently announced his latest scenery package called Polynesia 2000. Featuring Bora Bora, Huahine, Raiatea, Tupai, Tetiaroa Maupiti, Maiao, Moorea, Mururoa, Tahiti with Faa airport, Maiao, Mehetia, Macatea, Rangiroa, Mataiva, New Caledonia and the Marquises Islands, this add-on for Flight Simulator 2000 looks to be an exciting prospect for simmers. Detailed scenery with a ground texture resolution up to 3 metres per pixel should give some extremely accurate island rendering. This together with detailed night lighting effects makes this a great looking scenery package for all to enjoy. ■

Web: www.flightworld.org/Polynesia/Project.htm

FLIGHT SIM CALENDAR – WHAT A BEAUTY (AND IT'S FREE)

Rolf Wisotzky has made a beautiful calendar, in PDF format, as a tribute to all flight simmers. The calendar is a work of art with remarkable screenshots from well known Flight Simulator spots and aircraft. You can also get your hands on a printed version too, all for free. ■

Web Download: http://simflight.de/files/calendar2000.zip
A4 Printout format: http://simflight.de/files/cal2k_a4.zip

AIR WARRIOR 2000 - BIRMINGHAM BATTLE

Birmingham is to be the focal point for a re-enactment of the Battle of Britain – sixty years after the roar of aero engines filled the skies and the country braced itself for an invasion.

However, this time, the air combat will be over the internet, where up to 250 participants from Britain, Europe and the rest of the world can battle with each other by computer in the Air Warrior flight combat simulation. Massive dogfights will no-doubt develop, as players pitch World War Two Spitfires and Messerschmitts against each other, twisting and turning through virtual skies and striving to shoot each other down.

The convention will be held from Friday to Sunday, August 18-20th, at the Great Barr Hotel and Conference Centre, where a network of computers will be linked to the Internet. A variety of competitions will be held to find the 'Top Gun' of Air Warrior – and members of the public will be able to watch or maybe try their skill against a veteran computer pilot.

Those actually attending the convention will also enjoy lectures and after-dinner talks by real World War Two fighter pilots, as well as entering contests to raise money for this year's adopted charity, the Battle of Britain Memorial Fund. ■

Website: www.vulch.cwc.net/AW2000.html
Organiser: Phil Everitt
E-Mail: vulch@cwcom.net
Phone: 01923 777029(evenings) or 01923 837366(daytime).

AIRVENTURE 2000

Mark your calendars pilots! Oshkosh Airshow, known as AirVenture 2000, will be held from July 26th to August 1st this year. Visit the AirVenture web site for specific information such as ticket prices, where you will see history's greatest aircraft, a celebration of the 65th anniversary of the DC-3 and much more. Simflight.com will be covering this, the largest aviation event in the world, so you will be able to see real-time news updates online. If you are on holiday in America during July and August, this might be a good respite from sun bathing. Last year the temperature rose to 120 degrees! ■

Website: www.airventure.org/

ENGLISH AIRPORTS FOR FS98

Barry Perfect has now released his 'English Airports' for Flight Simulator 98. This shareware product features the 6 busiest airports in England, which Barry claims are "presented in the best detail yet." London Heathrow, London Gatwick, Manchester International, London Stansted, Birmingham International and London Luton are depicted. English airports have always been neglected in FS98 compared to other countries.

The scenery contains many details you can expect to see at the real airports. There are no default buildings, as all details have been modeled on the real airports (including new features at the real airports that are so new they are still under construction!). The scenery is currently for Flight Simulator 98 but the airports will hopefully be redesigned for Flight Simulator 2000 in the near future. ■

Web: www.gbairports.co.uk (a demo is available at www.simflight.com/share/gbairports/engaptsh01.zip)
Price: £12.50

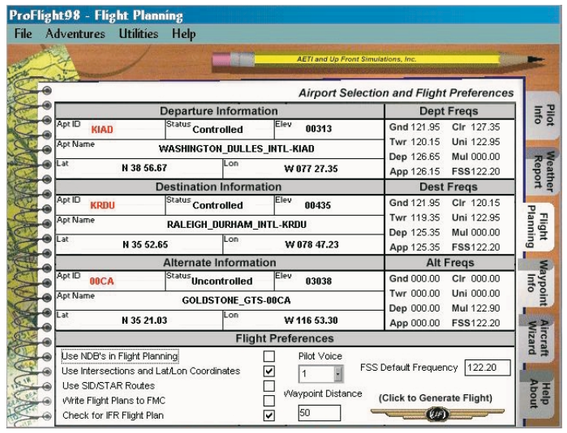
Luton and Gatwick are represented in all their glory

NEW ATC FILLS THE SKIES

ATC 2000 - Air Traffic Control Simulator

ATC 2000 is expected to allow individuals to 'enjoy' the experience of being in front of the radarscope as a departure and approach controller. The publishers claim that it will deliver all the dials, flight data information and silent nail biting, heart pounding tension that gives the Air Traffic Controller's job the notoriety of being the most stressful one in the world. This product focuses on TRACON, the ATC facility that controls and sequences aircraft into and out of airports, also popularly known as approach and departure control. It's the part of air traffic control where the most is happening and where the greatest challenge exists. ■

Website: www.pcaviator.com/atc2000



ProFlight 2000

AETI, have just announced the latest version of one of Flight Simulator's most popular add-ons. ProFlight 2000 reads routes generated in various flight planners and compiles them into realistic voice-driven ATC adventures that give pilots a real sense of being in contact with Air Traffic Control at every stage of their flight. From takeoff, en-route and landing clearance to weather generation, Proflight 2000 is expected to provide all the detailed aspects of flight that we crave. Expected to work fully with FS2000, this will be an add-on keep an eye on. Hopefully we'll more details or even a review next issue. ■

Website: www.simpilot.com

DOWNLOAD NOTAMS

New Flight Simulator 2000 Patch – now with shadows!

Microsoft has seemingly responded to requests and criticisms from the flight simulation community with an all-new update for FS2000. This update is all-inclusive, replacing the earlier released version.
Do note however that currently it works only with English-language versions of FS2000 – apparently localized versions are still in development.

Most importantly this update provides shadows for aircraft, buildings, and dynamic scenery. Fixes include improvements to the autopilot, ATIS and the Learjet and Boeing ADF. Voodoo2 cards now correctly render gauges too.

The update is either 7 or 9Mb depending on the version of FS2000 you own. ■

Website: www.microsoft.com/games/fs2000/downloads_fsupdate.htm

Microsoft releases developer SDKs

These long awaited files have at last been made available for those wishing to delve deeper into FS2000 and create their own aircraft or other add-ons. The SDK is in three parts:

The Aircraft Container SDK provides information about the Flight Simulator aircraft container system. It describes the 'aircraft.cfg' file in detail, explaining how different files are referenced within FS2000 for the aircraft itself. You don't have to be a programmer to use this document, but it does involve some fairly technical programming and aeronautical information.

The Multiplayer SDK explains how to write add-on products to take advantage of Flight Simulator's built in multiplayer functionality. You need to be a proficient developer for this document, familiar with C or C++ programming, as well as have a good background in the DirectX DirectPlay architecture.

Adventure Programming Language (APL) SDK contains documentation and all the necessary components for a sample adventure. This is the information you'll need to create your own adventures and lessons for Flight Simulator 2000. The Flight Simulator 2000 APL SDK is intended for experienced software developers familiar with a high level programming language such as C++ ■

Website: www.microsoft.com/games/fs2000/downloads_SDK2.htm

Jeppesen SIMCharts Patch

Jeppesen has released a patch for the very popular SIMCharts series of navigational mapping CD-ROMs. Make sure you get this update - it fixes several problems and updates the program to include more variables for the user. ■

Website: www.jeppesenpcpilot.com/tech.phtml

Airport 2000 v1 Patch for FS2000

Wilco Publishing has released an FS2000 upgrade for Airport 2000 Vol.1, including a third and new runway at LFPG (Paris), more realistic static aircraft on all airports, new navaids at KLAX and KJFK, new night light effects on buildings and static aircraft and new runway textures. ■

Website: www.wilcopub.com

FS Traffic - v1.05 Update

Lago has released version 1.05 of FS Traffic. Go to the FS Traffic site to download the full version or the patch. The Associates are also releasing this latest version on CD-ROM – more details from their site at www.flightsim.co.uk ■

Website: www.fstraffic.com

Fsuipc.dll and WideFS Updates

Peter Dowson has released v1.40 of fsuipc.dll and v3.40 of WideFS for use with FS98 and FS2000. FSUIPC.DLL replaces FS6IPC.DLL for use with FS2000 (reverse compatibility for FS98 add-ons) and WideFS links FS98, FS2000 and FS6IPC-interfaced utilities over a LAN, without needing to have a copy of FS on the second computer. The files are now available at the PFD Team web site. ■

Website: www.pfdteam.com

Updated Database for FS Navigator v3.0

Dennis has updated his FS2000 database for use with FS Navigator v3.0. It includes runway and ILS information, as well as the other FS2000 navaids, taxiways, fuel areas and corrected ATIS frequencies. ■

Web: www.flightsimmers.net/ddt/

LATEST GRAPHIC CARD DRIVERS

Creative Labs Graphics Blaster RIVA TNT:
http://updates.zdnet.com/products/pr_1735.htm *Updated: 8/3/00*

Creative Labs 3D Blaster RIVA TNT2 Ultra:
http://updates.zdnet.com/products/pr_6628.htm *Updated: 8/3/00*

Creative Labs 3D Blaster RIVA TNT2:
http://updates.zdnet.com/products/pr_6820.htm *Updated: 8/3/00*

3dfx Voodoo Banshee DirectX 7.0 Drivers:
http://updates.zdnet.com/products/pr_10054.htm *Updated: 15/2/00*

3dfx Voodoo3 3500 TV Drivers:
http://updates.zdnet.com/products/pr_8293.htm *Updated: 10/2/00*

3Dfx Voodoo3 Drivers AGP/PCI (DirectX 7):
http://updates.zdnet.com/products/pr_9859.htm *Updated: 10/2/00*

Diamond Viper V730\V770 and Ultra Drivers:
http://updates.zdnet.com/products/pr_6461.htm *Updated: 9/2/00*

Diamond Viper V550 for Windows 98:
http://updates.zdnet.com/products/pr_1752.htm *Updated: 9/2/00*

Diamond Viper V550 for Windows 95:
http://updates.zdnet.com/products/pr_1751.htm *Updated: 9/2/00*

Diamond Viper V550 Series Driver:
http://updates.zdnet.com/products/pr_1753.htm *Updated: 9/2/00*

Diamond Viper II Z200:
http://updates.zdnet.com/products/pr_10992.htm *Updated: 9/2/00*

Microsoft DirectX 7.0a
Fixes several known issues with version 7.0. More noticeably the performance of Sidewinder Force Feedback joysticks (which always seem to cause problems): www.microsoft.com/directx/

HARDWARE NEWS

For daily hardware news updates log onto
www.simflight.com

Intel Release 1GHz Processor

Just when you thought you had bought the latest and greatest PC, along comes something even better. Stop talking 'megahertz' and start thinking 'Gigahertz' – that's 1000 MHz!

Intel claim that their new Pentium III 1GHz processor is 15% faster than AMD's Athlon, as it features a 133MHz system bus and an integrated L2 cache, called 'Advanced Transfer Cache', that runs at the full speed of the processor core. Intel says that the new chip is available in limited numbers but should be more widely available later this year.

Dell, one of the worlds biggest PC Manufacturers has already started to take pre-orders for their high end 'Dimension' system that will include an nVidia GeForce video card with 64MB of memory, a 12X DVD, a 30GB hard drive, an 8X CD-RW drive, 256MB of Rambus Direct RAM and a 19" monitor. Price for this monster should come in under £2,000 and possibly fall quickly in the next few months.

What does this mean for PC pilots like us? Well, if you have a medium to low-end system, such as a Pentium 233MHz to 350MHz processor, you should seriously start thinking about upgrading. Not necessarily to a 1GHz but a medium grade spec, say 500-650MHz, as within the next few weeks the current price of these chips could quite literally fall through the floor by as much as 60%. ■

Turbulence in the Flight Simulation Skies

Arnie Lee is President of US company Abacus, one of the oldest established publishers of Flight Simulator add-ons. Abacus also publishes another flight simulation magazine, but that does not stop Arnie from being a thoroughly nice chap with great experience of flight simulation! In this issue of PC Pilot, Arnie gives us a publisher's perspective on the commercial future of flight simulation.

As a reader of PC Pilot, I know that you're a very ardent supporter of all things related to flight simulation. And like you, I too have been enjoying this extraordinary hobby for many years. I've cheered along side you as we've watched an incredible stream of advances in both computer hardware and software technology, which deliver even more realistic simulations to our desktops.

The upshot is clear: flight simulation 'state of the art' has never been higher. Yet within a few months the field will be elevated to even loftier levels, at least according to the many of the industry players that I've talked with recently. A slew of companies will soon be delivering more goodies for you to use. You know most of these companies by name: Aerosoft, The Associates, CH Products, Flight 1, Guillemot/Thrustmaster, Jeppesen, Looking Glass, Microsoft, Terminal Reality, Wilco and others as well. They're all planning to deliver new products for the fun and enjoyment of the flight simulation crowd.

Our company, Abacus, has been involved with flight simulation products for many years, first writing books and then as a maker of software add-ons and publisher of Full Throttle Magazine. We're so deeply involved in the flight simulation market that we had better listen up to the adage 'you can't see the forest for the trees'. We'd be wise to take a few steps back and look at the flight simulation marketplace from a distance.

Flight simulation has been and continues to be a niche market. While millions of consumers at one time or another have bought the various flight simulators, accessories and add-ons of all kinds, the actual number of dedicated individuals who call flight simulation a hobby is quite small. Look around - at school, in the office or among your family members - who do you know that is interested in flight simulation? All will have heard of the charms of Lara Croft, but how many have flown from Los Angeles to Heathrow on their PCs?

Flight simulation 'state of the art' has never been higher

Visit software stores, specialty retailers or discount chains and you'll be hard pressed to find many flight simulation products. When large software publishers such as Sierra (who produced ProPilot) and the grandfather of military sims, Microprose, cancel flight simulation products they are saying that there are too many products chasing a limited number of consumers.

Please don't misread me. The retail market is very viable. Eighty percent or more of our sales are made through the retail chain stores. But you are interested in many more flight simulation products than the average store carries. How are you going to get your hands on all of these new products that are due out shortly? Since the audience is too small, many fine products will never make it to the store shelves. If one of those products catches your eye, you may have to turn yourself into an active, persistent consumer in order to purchase it since it may not arrive at your local store otherwise.

Of course, there is an alternative to the high-street stores. For years, several mail order companies have been supplying a wide variety of items to a very loyal customer base. Among the better known of these are 4CDs, Computermate, Flight Sim Central, RC Simulations and SimWare. More recently many of these same companies have opened 'storefronts' on the web along with the big names like Amazon, Gameplay, Dixons and hundreds more.

Flight simulation has been and continues to be a niche market.

Still more interesting is direct delivery to your PC over the web. Several companies including Abacus and Lago already offer add-ons by download. In fact, companies with high quality products but without sufficient capital and expertise to negotiate with the retail chains will more easily prosper from the web. Expect this trend to continue and grow dramatically.

So there you have it - a huge selection of flight simulation products available now and more great products coming very soon. I'm looking forward to using the new items these companies have been telling me about. With such a lineup of new software and accessories arriving soon, the future of our hobby looks great. And just maybe, some of them will arrive by e-mail! ■

Arnie Lee
Arnie Lee can be contacted by e-mail at arnie@abacuspub.com
Find out more about Abacus at www.abacuspub.com

Comanche Hokum

Tree hugging, army-style

Cresting the tree line to take on all-comers is Razorworks' Comanche Hokum. It faces a tough time from the much anticipated rival, Gunship!, but the nine-man team from Kidlington, headed by a pair ex-Digital Integration supremos, is no novice outfit.

Razorworks' inaugural outing, Apache Havoc, lit up radar scopes all round because of its incredibly detailed dynamic campaign and truly vertical countryside. Arguably the best chopper sim to date, Comanche Hokum builds on this solid game engine and refines it across the board.

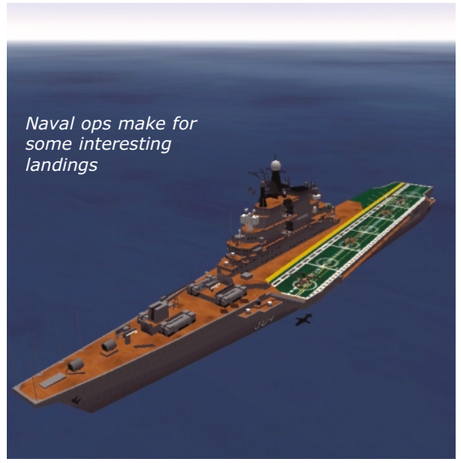
Bogeys at ten o'clock high, I see 'em

Airwolf eat your heart out, the Comanche is here to stay

The graphics now look sharper than ever, with more detail and some stunning lighting effects to set the scene. Running at up to 1600x1280 resolution with Transform and Lighting support, flying is a joy. The team promise that owners of Apache Havoc will experience similar frame rates to the original title on their PCs. Our experiences with the Beta version reinforce this claim.

It's just as well that higher resolutions are supported, as the pilot and gunner cockpit positions now sport luxurious 3D virtual interiors. Being able to flick between the two positions, and fly the helicopter from either, makes MFD (Multi-Function Display) management a doddle. While the interior views are improved with a new slew of padlock options, it is the outside camera angles that really make the battlefield come to life.

Hide and seek, watch out for those sneaky SAMS



Naval ops make for some interesting landings

Schizophrenic flying, hop between pilot and co-pilots seats at the touch of a button

Play hide-and-seek downtown

Hopping around the battlefield is a breeze with the fantastic new object view selector

The multi-purpose padlock view is a joy to use

The crux of Apache Havoc and Comanche Hokum is the extensive dynamic campaign. Rather than crafting scripted missions, Razorworks decided early on to concentrate their efforts on creating the ultimate combat world. This latest incarnation features more vehicle types, and most importantly, improved AI (Artificial Intelligence). Combatants behave more like soldiers now and fight back rather than just sitting there like raw recruits. And that doesn't just go for the enemy. Rather than hammering towards targets like kamikaze pilots, your wingmen will search out cover, drop behind it and wait until you give them the go ahead to pop-up and shoot.

Managing the battle is now given much more scope, with an excellent central map screen showing skirmishes in progress and allowing you to view, and jump anywhere or into any helicopter. An innovative, hierarchical vehicle view menu also allows you to follow units and keep track of the battle with ease.

In the ultra-modern Comanche, battle-craft is especially important. In many ways the Comanche is Airwolf incarnate, both in its sleek lines and stealth-like properties. Staying buttoned up and keeping an eye on your radar cross-section meter is key to sneaking up on unsuspecting rebels. While it may look wimpier than the almighty Apache, the Comanche can still put 14 Hellfire or 28 Stinger missiles on target. The Hokum is no slouch either, being super-manoeuvrable with its contra-rotating main rotors. And the ejector seat is certainly unique, offering an alternative to attempting an auto-rotative landing.

Three new campaigns are included, but for owners of Apache Havoc you can play the old scenarios too. Not only that, but the existing helicopters are also made available allowing you to switch between Comanche-Apache and Havoc-Hokum seats making for some marvellous multiplayer scenarios.

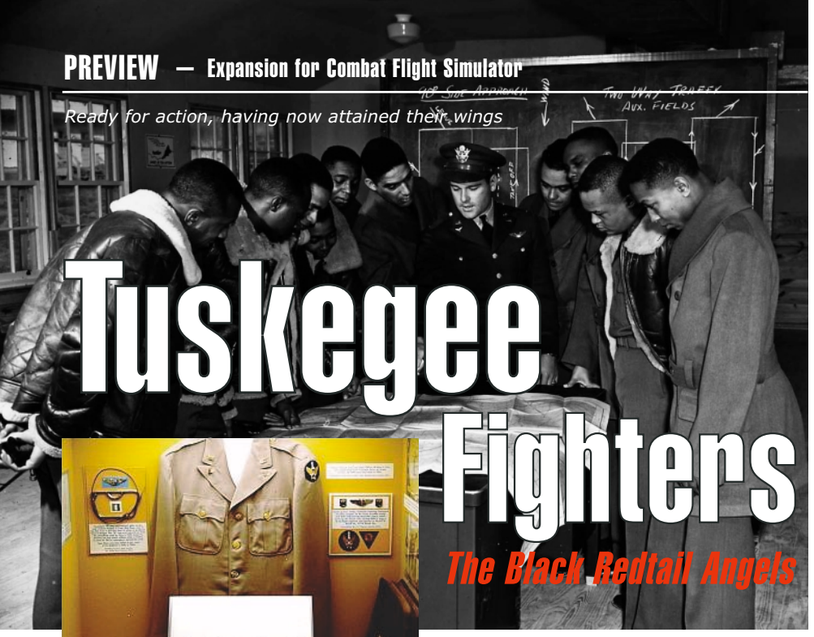
We'll have to wait until next issue to see if Gunship! and Team Alligator can down Comanche Hokum, but from our impressions it looks like Razorworks may have the edge in terms of sheer depth and playability. ■

Kenji Takeda

Taking down the Navy boys with ease

PREVIEW

Publisher:	Empire Interactive	**Price:**	£29.99
Website:	www.empire.co.uk	**Expected Release Date:**	April 2000
Developer:	Razorworks		



Ready for action, having now attained their wings

Tuskegee Fighters

The Black Redtail Angels

A typical Tuskegee airman's uniform

Ready for take-off in the Mustang

A real P-51 Mustang

The rather spartan cockpit of the P-51

P-51D Mustang prototype

On their entry into World War II (in an effort to appear even-handed where ethnic servicemen were concerned) the American Air Force created a squadron manned by 450 black airmen, who were trained in a segregated military camp, near an obscure western town in Alabama called Tuskegee. They soon became familiar to the servicemen who fought in the North African campaign where the courageous and skilful flyers of the 332nd Fighter Group became better known as the Tuskegee Fighters.

The first class graduated from Tuskegee on March 7th, 1942 and among those who earned their wings was Benjamin O. Davis, Jr., who later commanded the 332nd and eventually rose to the rank of General. Another Tuskegee graduate, the late General Daniel 'Chappie' James, was the first African-American to wear General's stars.

Unfortunately these great achievements were made despite considerable racial prejudice and the efforts of a small number of bigots who wanted to see them fail. It was widely believed among white officers that African-Americans were not intelligent enough to master the skill of flying. However, the Tuskegee Fighters were to prove them wrong by destroying more than 400 enemy aircraft, winning over 900 decorations and without the loss of a single bomber to enemy fighters in over 1,000 missions.

Pilots under training are given a pre-flight briefing

In order to perpetuate the legend, the Tuskegee Fighters and their exploits are soon to be the subject of a new release from Abacus. The package will consist of new aircraft, scenery and missions for Microsoft's Combat Simulator. You are taken back to the early 1940's where you'll train with the Tuskegee airmen in a Stearman bi-plane, until you're competent to enter service in North Africa. You'll have your combat introduction against the Germans flying the Republic P-47 Thunderbolt, before finally being let loose in the much more powerful P-51 Mustang, with the distinctive red tail, which was the trademark of the Tuskegee fighters and gave rise to their nickname, the Black Redtail Angels.

After your baptism of fire you'll be reassigned to Northern Italy where you'll fly as escort for U.S. bombers. This was where the Tuskegee airmen really won fame, protecting their flock with an aggression and skill that earned them the respect of friend and foe alike. The German pilots referred to them as the "Schwartze Vogelmenshen", literally "Black Birdmen".

There are other aircraft in the package, including the P-47 Thunderbolt, T-6 Texan and P-40 Kittyhawk, designed by Terry Hill and Alain L'Homme, who have both been involved in other Abacus projects. In addition, scenery designer Tim Dickens has extended the default Combat Flight Simulator scenery to include Italy and southern Austria, incorporating a large portion of the Alps. Finally, Chris Steele has created a set of missions for Tuskegee Fighters based on documentary evidence of actual sorties.

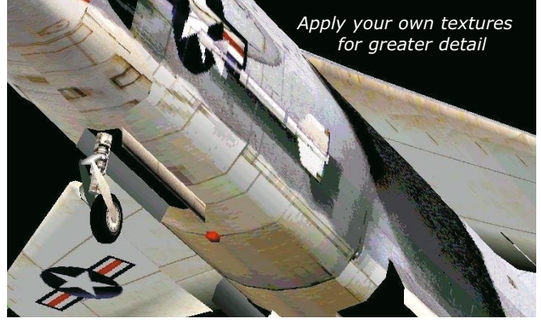
Could be an interesting and slightly different angle for Combat Flight Simulator aces out there. ■

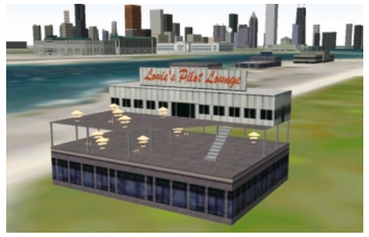
Joe Lavery

PREVIEW

Publisher:	Abacus	**Price:**	£29.99
Website:	www.abacuspub.com	**Expected Release Date:**	April 2000
Developers:	Abacus		

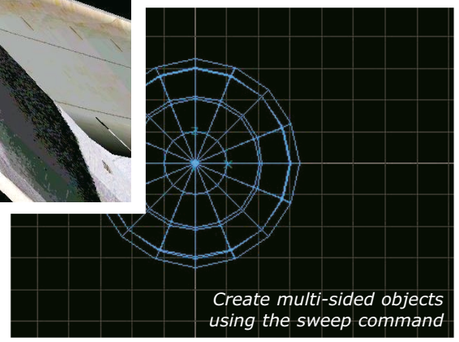
A line up of the pilots with a P-47 in the background

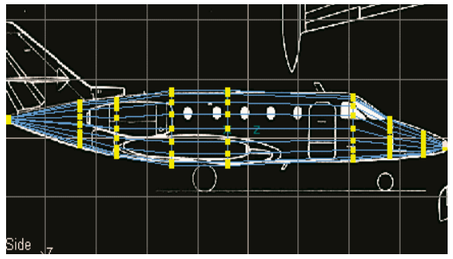

Apply your own textures for greater detail



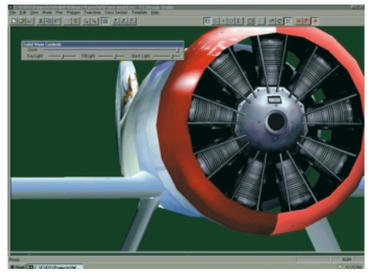
Create distinctive one-off designs

More sections make for smoother curves


Create multi-sided objects using the sweep command



Create your objects using a template

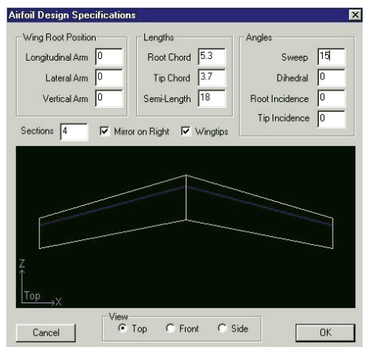

The rendition of this radial engine is far above anything we've seen to date

Transparent canopies, moulded tyres, and accurately shaped fuselage - the possibilities are endless

FS Design Studio

So, you want to change the world?

The popularity of Microsoft's Flight Simulator is undoubtedly due to two major factors. Firstly, it allows would-be pilots to explore the world of flight without the considerable financial constraints. Secondly, because it has such an open architecture, it offers amateur aircraft and scenery designers the opportunity to customise their flight adventures to suit their own requirements.



Special dialogues for creating specific parts

However, when Flight Simulator was first released it required a very detailed knowledge of the inner workings of its program 'engine' in order to customise anything. A reasonable level of programming skill and a degree of artistic flair were also necessary.

However, ready-made scenery designers, of varying complexity have since been produced by many familiar names, with Abacus, Apollo and Lago among the most prominent. Unfortunately, they all seem to suffer from an unwieldy interface and the inability to create the sort of scenery objects you see in products like Airport 2000 or German Airports. Admittedly, these design programs all come with lots of ready-made objects for you to drop into your Flight Simulator world, but in most cases they are not ideal when you're trying to recreate a specific airport.

It now appears that Abacus are about to release a product that does exactly what we all want, in the form of a new scenery designer called FS Design Studio - available in both Standard and Pro editions. This, Abacus claim, has been developed from the ground up by Louis Sinclair, using a new but more familiar interface based on conventional CAD (Computer Aided Design). It displays four views of the object under construction, looking from top, left, right and perspective and includes a range of tools suitable for designing everything from a lamppost to a stately home. The completed design can be saved as standard scenery BGLs, DynKit-compatible BGLs (for adding dynamic scenery), raw SCASM source code for compiling with SCASM, or ASD-compatible SCASM macros for use with Airport & Scenery Designer.

The primary difference between FS Design Studio Pro and the cheaper standard version is that the Pro version also doubles as an aircraft designer and incorporates a range of predefined parts that can be fully edited. Texture mapping and 3D mesh tools create much more realistic surfaces, using up to 24-section tubes. At present the best aircraft designs only use a 12 or 16-section tube for their body shells. We're told you can even tag any moving parts for later processing with the Abacus Aircraft Animator, which sadly is not included in the package. Once you're happy with the shape, you can use the Abacus flight dynamics editor to fine-tune your aircraft so they'll fly as well as they look.

If the announced specifications end up in the boxed product, this should be the last word in scenery designers. ■

Joe Lavery

PREVIEW

Publisher:	Abacus	**Price:**	£39.99 & £59.99
Website:	www.abacus.com	**Expected Release Date:**	May 2000
Developers:	Louis Sinclair		

FS Clouds 2000

Vapourware for FS2000

From the excellent team of programmers that brought you titles such as Flight Director 99, Jumbo 747, Atlanta-based Flight One Software has now decided to take their original FS Clouds and Textures Pro concept and unleash an update called FS Clouds 2000 for Flight Simulator 2000 (FS2000).

Multi-Layering of cloud effects, make flying a real joy and extremely realistic

One of the great details included with FS Clouds 2000, JetTrails – Wooosh!

Like the previous version, FS Clouds for FS2000 is an add-on utility that takes what seems to be a reasonably realistic weather system in Flight Simulator 2000 and transform it into a, well, more realistic weather system for Flight Simulator 2000! The obvious question is just how can they possibly make Flight Simulator 2000's weather and cloud depictions even better than they are at the moment? They hardly seem desperately lacking.

Flight One says that they have developed a system that provides, "different regular and 3D style cloud sets that lack the traditional pixeling and act more like true vaporous clouds". In plain English this means that we can expect far less blocky textures that one sees when getting close to the clouds in FS2000 and hopefully a greater variety of more delicate cloud structures. Also, FS Clouds 2000 has cleverly managed to incorporate jet-trails – which along with titles like FS Traffic will help make those skies seem just a little less empty.

As most users have discovered, FS2000's weather system, especially cloud formations, have a significant impact on a PC's performance. Will enhancing an already over-stretched weather system really do your simulation any good? Flight One assures us that FS Clouds 2000 "does not hurt performance. In fact, some users may gain some performance." A mighty claim that we hope is realised.

FS Clouds and Textures Pro, the original enhancement for Flight Simulator (all the way back to v5.1!), was criticised for an awful interface that often seemed to require a mathematics degree to navigate your way through. We asked Steve Halpern, CEO of Flight One, if this had been improved upon: "No math required! Most is all mouse driven except when you need to enter an airport name." As the screen shots show, Flight One does appear to have tightened up considerably on this aspect.

Other enhanced features that we are told will be included are a 'Quick Flight' facility, where FS Clouds allows you to set up approaches to any FS2000 airport. One can also create and 'package' scenarios for later use, or to upload to the Internet and a weather files system that can be archived and then mixed and matched with flights at a later stage.

Flight One's publishing partners, The Associates, claim that the original FS Clouds was one of the best selling add-ons for Flight Simulator 98. If so, then plenty of you will no doubt recall the niggles that spoilt an otherwise sound product – a hard-to-read orange manual and a 'front-end' based on the dashboard of a Skoda! On a positive note, the preview screenshots of FS Clouds 2000 look extremely good. The interface also looks much easier to navigate through and we sincerely hope this lives up to Flight One's promises. ■

Mike Clark

Enhanced interface looks to be improved, but does it work better than before?

The main interface that connects you to FS Clouds. Looks strangely familiar

PREVIEW			
Publisher:	Flight One/The Associates	**Price:**	£24.99
Website:	www.flight1.com	**Expected Release Date:**	April 2000
Developers:	Flight One		

Private Pilot

This close-up shows the detailed interior of the Katana

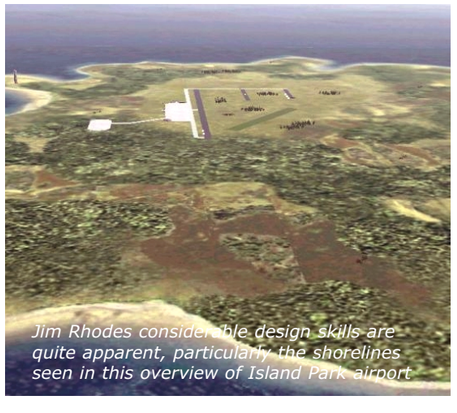
A close up of the Piper Saratoga II, highlights the almost photographic quality of the design and attention to detail

Judging from this shot, the pilot needs to adopt a steeper short field approach to this challenge!

One of the challenges involves landing with a 50-foot obstacle on the runway

ATC will not be pleased with the pilot of this Katana, who appears to have parked his plane at the end of the runway!

All the aircraft have fully functional and beautifully designed panels, as the shot of this Beech V-35 cockpit shows



Jim Rhodes considerable design skills are quite apparent, particularly the shorelines seen in this overview of Island Park airport

There's nothing like the buzz you get as you trundle down the runway in a light aircraft, or the elation you feel after successfully executing a particularly awkward crosswind landing. This is precisely why airline pilots return to their roots and, in many cases, take to the air on their days off to experience 'real flying'.

However for us mere mortals, we must rely on programs like Microsoft's Flight Simulator to provide such an experience. They give anyone the opportunity to climb into that coveted left hand seat and fly aircraft types that we can normally only dream about. Although Flight Simulator comes equipped with a range of aircraft, the sheer number of commercial and freeware models available indicate just how popular such products are.

The subject under preview here, 'Private Pilot' from Abacus, offers a baker's dozen of the finest light aircraft found in general aviation. Ranging from the innovative Diamond Katana and Piper Saratoga II singles, to the Cessna 310 and Beechcraft Twins.

"Golf-Victor-Whiskey downwind"

Terry Hill, responsible for many different simulated aircraft over the years and familiar to enthusiasts, designed the aircraft. As you can see from the screen shots, his new aircraft are beautifully modelled with moving control surfaces, fully mobile undercarriages and transparent windows. Chris Arrington, who is equally well known for his panel designs, constructed the interiors and we're told that the same amount of work has gone into the flight dynamics, to ensure a high standard of flight.

This package also includes a detailed scenery area called Island Park where you can fly your new aircraft. Designed by Jim Rhodes, it provides both a place to practice and also an obstacle course to show off your flying skills. Other features include individual checklist cards for each aircraft, a guide to basic aircraft manoeuvres and an authentic Chicago area sectional map. You also get a multi-purpose computerised calculator to determine weight and balance, wind correction angles, density altitudes and pressure patterns… Quite a package! ■

Joe Lavery

PREVIEW			
Publisher:	Abacus	**Price:**	£29.99
Website:	www.abacuspub.com	**Expected Release Date:**	April 2000
Developers:	Terry Hill		

Advanced Flying

So you've flown around the world using Flight Simulator 2000 or your other favourite simulator and done most of the tutorials and exercises, including PC Pilot's tutorials by Bill Stack. If you are now yearning for yet more realistic flying, then try your hand at the flight provided here, written by experienced real-world pilot, Stephen Heyworth. It is presented with Flight Simulator 2000 in mind, but could easily be adapted for use in other simulators.

Be aware that this feature is aimed at simulator pilots experienced at flying with instruments – the usual precautions recommended by Bill Stack apply. Explanations and definitions of the procedures and acronyms used can be found in Bill's tutorials and within the Glossary at the back of the magazine.

Have a great flight!

Simulator Setup

Airport:	Liverpool EGGP
Runway:	27

Weather:

Clouds:	Overcast layer with a 1,000ft cloud base and 3,000ft tops
Precipitation:	Medium
Wind:	270° at 20 knots gusting to 25 knots up to 10,000 feet.
Turbulence:	Occasional
Visibility:	3 miles below 3,000 feet.
Realism:	High (Make sure you include DI drift)

If you want to have a tricky challenge, set the vacuum system to fail some time during your flight. These systems rarely fail but pilots are trained to detect and cope with such failures.

If you want the flight to be realistic, do not pause the flight. Part of the challenge of real flying is that you cannot stop and think about what you are doing. If things appear wrong, you have to work out what is happening and deal with it at the same time as the aircraft cruises merrily along at two miles per minute. So if you miss a check point and think about it for 10 minutes you could be 20 miles further off your track!

Flight Plan

The flight is a relatively straightforward air taxi flight from Liverpool to Leeds Bradford in the Cessna Skylane 182S, but the weather has closed in making instrument flying essential. All your flight planning has been done by your trusty co-pilot and he tells you that he already has your clearance which is Pole Hill Four Tango, Direct Lima Bravo Alpha at 4,000 feet, Leeds Bradford, expect ILS/DME on 32.

This means that you have been given a Standard Instrument Departure (SID) called `Pole Hill Four Tango', which takes you to the Pole Hill VOR and then cleared directly to your destination at an altitude of 4,000 feet. The flight will use the three 'plates' (included with this article), which are the Liverpool SID together with the Leeds Bradford Arrival and Approach charts.

Final Checks

Finally, before you fly, check the SID for the details of the first part of your flight. You will see that you have to fly on the runway heading until you have reached 1.5 miles DME and then turn right onto heading 020. Hang on a minute, if you do that the wind will blow you off course so you must make corrections for the wind. The easiest way to do this is to look at your DI. You can see that when you are heading 020, the wind (from 270) will be from your left and a bit behind. At a climb speed of about 90 knots, the correction for a side wind will be about two-thirds the wind speed. Because the wind isn't directly abeam, you should reduce the drift to 10 degrees correction, looking at the DI will show how much to reduce the heading. This is a bit inaccurate, but as you never know the wind exactly, it will be good enough. Therefore, the heading after your first turn will be 010 degrees to remain on track.

Preflight Preparation

Set the communication radios as follows:

COM1:	118:10 Liverpool tower
NAV1:	111.75 Liverpool ILS - Check the Morse ident is ILQ by clicking on the on/off knob
NAV2:	112.10 Pole Hill VOR
ADF:	349.5 - Check the Morse ident is LPL
DME:	R1 - i.e. set to show the distance from the ILS
Autopilot:	Off

Set the OBS on NAV2 to 66 degrees, this is your intercept on the last part of Pole Hill Four Tango.

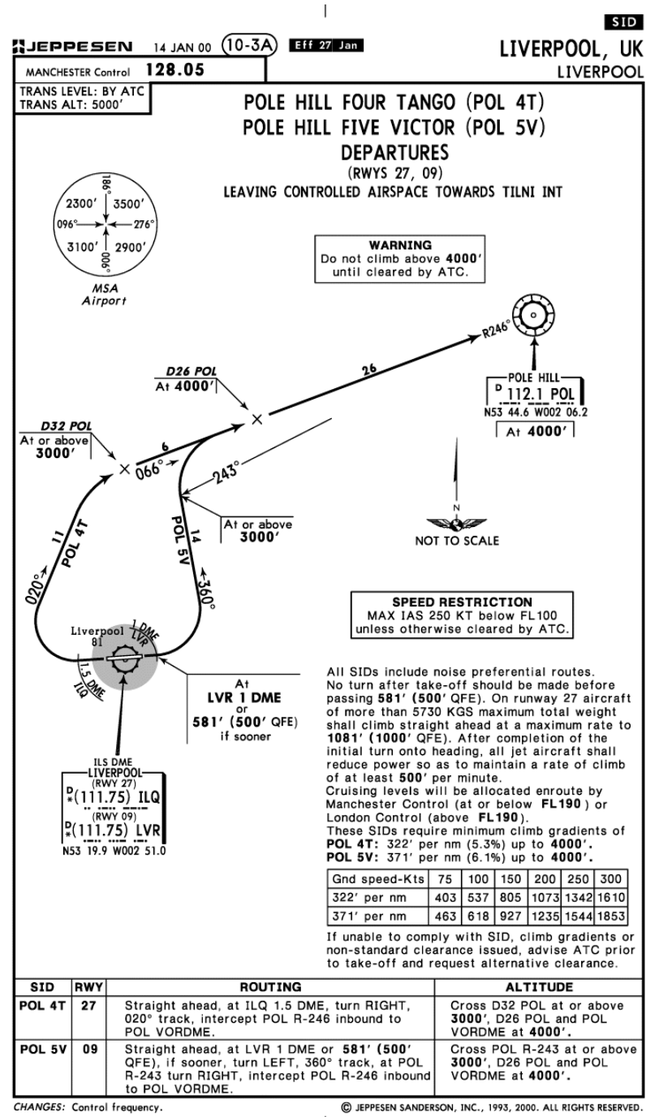
In Flight Simulator 2000, press 'D' to align the DI with the magnetic compass. Set the red heading bug on the Direction Indicator to 272, this is your initial heading. In the absence of a proper check list, do a quick left to right across the panel checking everything, but especially that the magnetos, the masters, fuel pump and pitot heat are on; that the flaps are up, the cowl is open and that the fuel is on both tanks.

Take-off

Now you are ready to fly, so release the brakes and smoothly open the throttle until you have full power. Keep straight along the runway and as you roll check that the engine is working properly. You should see the maximum 2400 RPM and both the oil temperature and pressure in their green arcs. If you don't, abort the take off and investigate why. It's much easier to solve problems with engines on the ground than in the air!

It's gusting a bit so wait until about 75 knots and then gently pull back on the stick rotating the aircraft to 10 degrees, the second graduation on the AI. When things stabilise reasonably, which they will do quickly, trim the aircraft to fly pretty much hands-off with only small corrections. Check your engine again before you reach the clouds. As you reach 500 feet above the runway, set your pitch to give attain 500 feet per minute vertical speed and ease back on the throttle to give 23 inches on the manifold pressure. As you climb and the air gets thinner, you will have to advance the throttle to keep maintain this 23 inches.

Stay on the heading 272 and keep an eye on the DME. Remember about being prepared and when the DME reaches 1.0 DME turn the DI heading bug onto 010. Then when you reach 1.5 DME everything is set up, all you have to do is turn right until you reach the DI bug. You should still hold your rate of climb and the turn should be rate one. A rate one turn is the standard instrument turn. Roll right until the wingtip of the aircraft on the turn co-ordinator lines up with the tick


SID
JEPPESEN 14 JAN 00 10-3A Eff 27 Jan
LIVERPOOL, UK
LIVERPOOL
MANCHESTER Control 128.05
TRANS LEVEL: BY ATC
TRANS ALT: 5000'
POLE HILL FOUR TANGO (POL 4T)
POLE HILL FIVE VICTOR (POL 5V)
DEPARTURES
(RWYS 27, 09)
LEAVING CONTROLLED AIRSPACE TOWARDS TILNI INT
MSA
Airport
WARNING
Do not climb above 4000'
until cleared by ATC.
D26 POL
At 4000'
D32 POL
At or above
3000'
POLE HILL
D 112.1 POL
N53 44.6 W002 06.2
At 4000'
R246°
26
066°
243°
At or above
3000'
NOT TO SCALE
POL 4T
POL 5V
020°
360°
Liverpool
8I
LVR
1.5 DME
ILQ
At
LVR 1 DME
or
581' (500' QFE)
if sooner
ILS DME
LIVERPOOL
(RWY 27)
D (111.75) ILQ
(RWY 09)
D (111.75) LVR
N53 19.9 W002 51.0
SPEED RESTRICTION
MAX IAS 250 KT below FL100
unless otherwise cleared by ATC.
All SIDs include noise preferential routes.
No turn after take-off should be made before passing 581' (500' QFE). On runway 27 aircraft of more than 5730 KGS maximum total weight shall climb straight ahead at a maximum rate to 1081' (1000' QFE). After completion of the initial turn onto heading, all jet aircraft shall reduce power so as to maintain a rate of climb of at least 500' per minute.
Cruising levels will be allocated enroute by Manchester Control (at or below FL190) or London Control (above FL190).
These SIDs require minimum climb gradients of
POL 4T: 322' per nm (5.3%) up to 4000'.
POL 5V: 371' per nm (6.1%) up to 4000'.
Gnd speed-Kts 75 100 150 200 250 300
322' per nm 403 537 805 1073 1342 1610
371' per nm 463 618 927 1235 1544 1853
If unable to comply with SID, climb gradients or non-standard clearance issued, advise ATC prior to take-off and request alternative clearance.
SID RWY ROUTING ALTITUDE
POL 4T 27 Straight ahead, at ILQ 1.5 DME, turn RIGHT, 020° track, intercept POL R-246 inbound to POL VORDME. Cross D32 POL at or above 3000', D26 POL and POL VORDME at 4000'.
POL 5V 09 Straight ahead, at LVR 1 DME or 581' (500' QFE), if sooner, turn LEFT, 360° track, at POL R-243 turn RIGHT, intercept POL R-246 inbound to POL VORDME. Cross POL R-243 at or above 3000', D26 POL and POL VORDME at 4000'.
CHANGES: Control frequency.
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'Pole Hill Four Tango'

by the `R' and keep it there. Start to roll out of your turn 10 degrees before you reach your heading, this way you won't overshoot or turn your passengers grey (incidentally passengers rarely turn green, they usually go straight to grey!).

At 1,500 feet switch off the fuel pump and the landing light and change Com frequency to Liverpool Approach on 119.85. You would normally get a call from air traffic control to tell you to change frequency, but here you will have to do it yourself. Now carry out a quick 'FREDAI' check. These letters stand for:

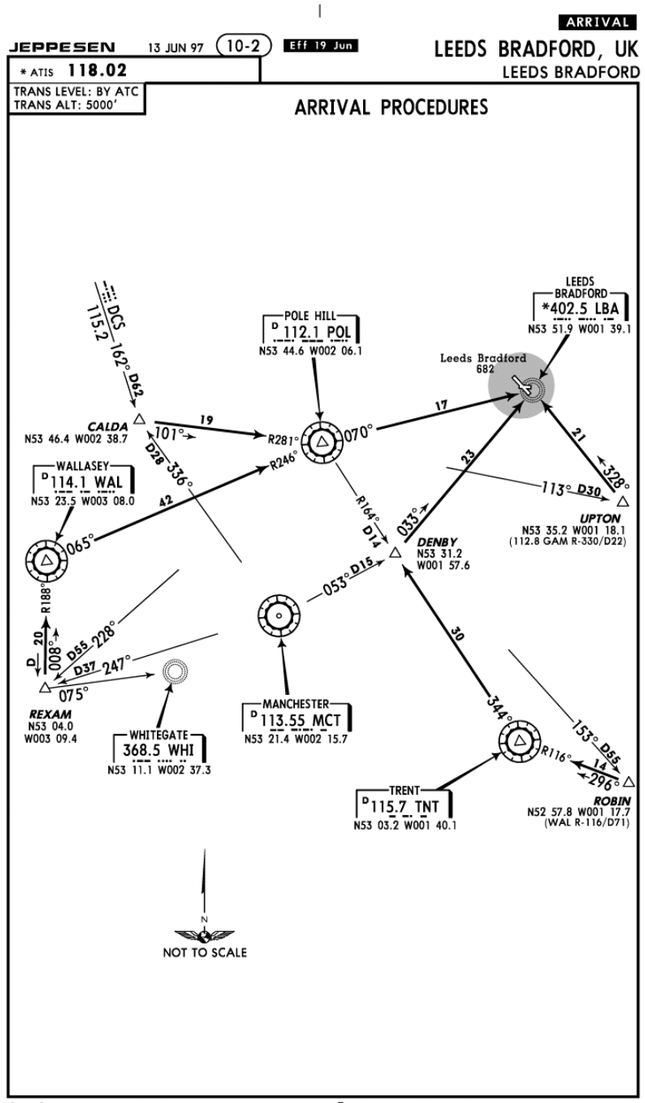
Fuel - Is there enough to reach your destination and are you managing it properly?
Radio – are they on the correct frequencies and identified?
Engine - check all gauges and levers.
DI – is it aligned with the magnetic compass?
Altimeter – is it on the correct setting?
Icing - is it affecting the flight?

Pole Hill

During the turn, you will have noticed that NAV2 became active when you climbed high enough to receive the VOR signal. You can now ident the beacon and you should hear the Morse code for POL. Once you do, you can swap the DME to R2, which will then show the DME from Pole Hill.

You are required to reach 3000 feet by the time you are on the 246 radial from Pole Hill at 32 DME and 4,000 feet before you reach 26 DME. This should not be a problem if you have everything else right. When you do reach 4,000 feet, level off, close the cowl and trim for level flight.

Soon the CDI on the VOR will start to move. Think about the heading you will need to fly to stay on course. Look at the DI and you will see that the wind will be almost directly behind you when you are on the Pole Hill 066 radial, so 066 is a reasonable first heading. Just before it



Prepare for the Approach

reaches the centre, turn onto heading 066 and then make small adjustments to your heading to keep the needle in the middle. Small means heading changes of a few degrees at a time and the technique is to make a small change in heading and wait a couple of minutes to see the effect it has on the CDI needle. Remember not to chase the needle, as it never works. Don't forget to level off and hold your altitude at 4,000 feet too.

Now you have some time to think so start to set yourself up for as much of the rest of the journey as possible. Start with another 'FREDAI' check.

Set the NDB on the Leeds Bradford aerodrome on 402.5 and NAV1 to 110.90. Both of these will be out of range so you cannot ident them yet.

Leeds Bradford Arrival

When you get close to the Pole Hill the CDI needle will swing away from the centre, don't try to follow it. Hold the heading that has been good for the last twenty miles. When you pass over the beacon the indicator on the VOR will change from an upwards arrow to a downwards arrow, showing that you have changed from moving towards the beacon to away from the beacon on your chosen radial. Now turn onto 070 and set the NAV2 OBS to 070. Don't try to get the CDI needle in the middle too fast, wait a minute or so to see what it does and as before, make small changes in your heading to centre it.

Now check the NDB Morse ident is LBA (Leeds Bradford Arrival) to confirm that you are receiving it satisfactorily. Your objective is to arrive exactly overhead the NDB following a track of 070. This means that the bearing from you to the NDB will always be 070. In this case, there will be about 5 degrees of wind from the left (use the DI as your wind computer but you use 50% of the wind as you are now flying at about 120 knots) and you will fly on 065 with the ADF needle on 5 degrees. Hence, if the wind is from the left, fly left of your desired heading and point the ADF to the right by the same amount.

QNH and QFE

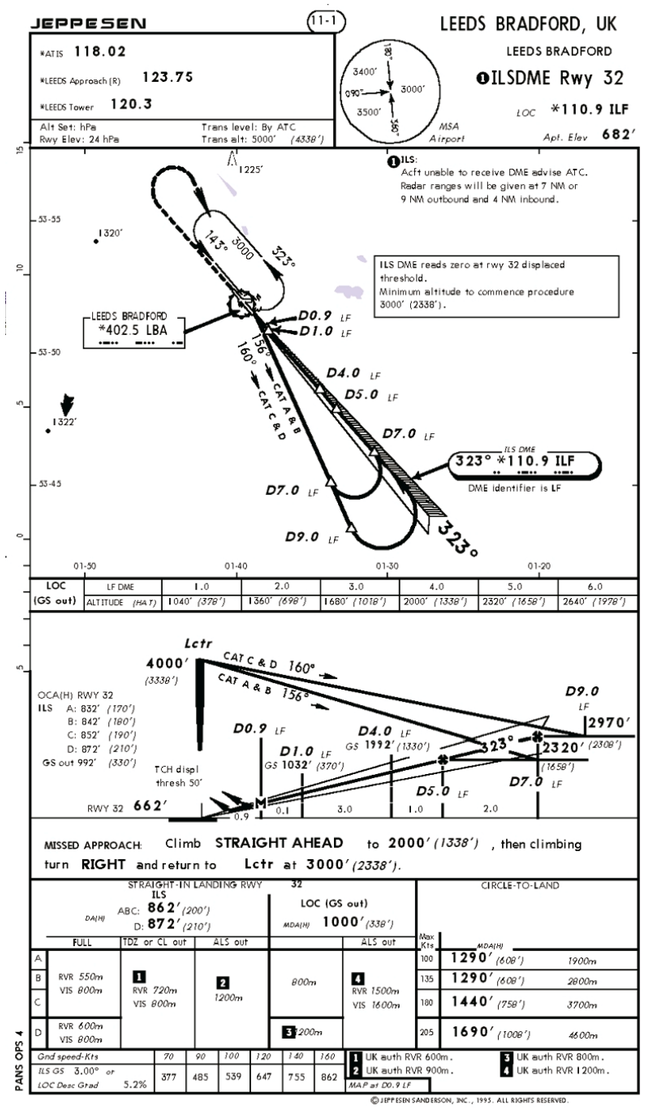
Tune in the ATIS on COM1 on 118.025 and note the weather. Of key interest to you will be the altimeter setting, which will probably be given as 29.91. This would be called the QNH in the UK and it is the setting to put on the altimeter to make it read the height above sea level. You need to convert this to a setting that will make the altimeter read the height above the runway. Using the American system, subtract 0.1 from the QNH for every hundred feet the aerodrome is above sea level. In this case the aerodrome is at 682 feet so subtract 0.7 to give the QFE as 29.2. You would normally be given both the QNH and QFE. In the UK the calculation is to subtract 1 mBar for every 30 feet. Using the QFE for your final approach is an extremely good idea as it avoids the extra hassle of thinking when things get busy and stressful. Don't set the QFE just yet, but do make a note of it for later. Once you have the ATIS information you need, tune in to Leeds Bradford approach on 123.75.

Your co-pilot now tells you that he has spoken to Leeds Bradford and the approach will indeed be a procedural ILS/DME onto 32 and that the significant parts of the weather have been reported as overcast at 300 feet in rain, with no wind and good enough visibility. You are licensed to approach with cloud-bases down to 200 feet above the runway so you can accept this.

As the distance from Pole Hill to Leeds Bradford is only 17 miles and you will be cruising at about 120 knots, you will be there in less than 9 minutes. So you will need to get the key approach plate details fixed in your mind fairly quickly. These are the outbound heading, which is 156, the distance to the turn, which is DME 7 for the ILS and the height of the turn, which is 2,320 feet. At about DME 15 change the DME to R1 to give the distance from the ILS transmitter for the procedural approach. Now think about the effects of wind on these headings, in particular your outbound heading will be about 170. Also, do another 'FREDAI' check.

Beacon Outbound

As soon as the LBA beacon is passed and the ADF needle swings past the horizontal, turn onto the heading 170 and start a decent to 2,320 feet. Extend one stage of flap and reduce power until you reach 90 knots. During this outbound leg, you have to be on a bearing of 156 from the NDB. This is not the same as steering a heading of 156 degrees, so you will have to adjust your heading to allow for the wind to stay on track. Imagine the ADF needle superimposed on top of the DI to show the radial from the NDB. Carry out your pre-landing checks on this outbound leg. The most common list of things to check is remembered as the unusual word BUMPFICHH, which are Brakes, Undercarriage, Mature, Pitch, Fuel, Instruments, Carburetor, Harness and



Hatches. Level off when you reach 2,320 feet and increase power to maintain 90 knots.

Final Approach

At DME 7 turn left all the way to 323 degrees, taking wind into account to intercept the ILS localizer needle. If you reach heading 008 (which is when there is 45 degrees still to go) before the localizer needle is active, hold this heading until the CDI starts to move. Similarly, if you pass through the localizer before you can capture it, turn past 323 to about 300 degrees and wait for the needle to come back. Hold 2,320 feet until the glide slope needle comes down to meet you and then simply keep the two needles bang in the middle. If your corrections in heading and pitch were small before, now make them miniscule. Smoothness and anticipation are the name of the game here. Once you have captured both of the needles, set the QFE 29.2 on the altimeter and check the missed approach procedure, which in this case is to climb straight ahead to 2,000 feet and then a climbing turn right to the NDB at 3,000 feet to start all over again.

At about 300 feet, you should break out of the cloud with the runway directly in front of you and be able to carry out a normal landing. This will make your passengers very relieved and so in awe that they will regard you as something superhuman forever. It is always the same; your passengers will rate your flying on your landings and never notice the hard part, which is finding the runway in the first place! ■

Stephen Heyworth

The Cessna panel layout is shown below. This is what you should expect your gauges to read on the final decent into Leeds.
Small corrections are essential to maintain controlled flight. By gently pulling back on the throttle you will maintain a constant speed of 90kts. This together with constant decent rate of 700fpm will ease into a perfect ILS landing onto runway 32.

Terminal-tastic

Pushing the envelope in terms of scenery and adventure design is something that Wilco has proven to be rather good at. Airport 2000 Volume 1 was an astounding feat of engineering, lifting the stakes for what could be achieved with Flight Simulator 98 (FS98). Now capitalising on the release of Flight Simulator 2000 (FS2000), Volume 2 promises to bring more spectacular delights to PC flyers everywhere.

For British simmers the highlight is undoubtedly the enticing recreation of London Heathrow. Pilots and passengers who have been through the 'world's busiest airport' will recognise it immediately, as the level of photo-realism is astounding. Detailing of the terminal buildings, old and new, not only extends to the outside, but is equally convincing on the inside. Many of the glass buildings and walkways are populated with excited looking travellers. The airways will come and dock to your aircraft once you've sidled up to the gate, and even have friendly looking stewardesses waiting to greet you.

It's not only the buildings that have been given the star treatment. The positioning and shape of the taxiways are more rounded and precise. New textures for the runways and taxiways are a huge improvement over the dull grey default scenery. A massive amount of lighting around the taxiways and floodlit terminal buildings make the whole airport come to life at night, emitting a warm fuzzy glow for all to see. Finding LHR from any direction is now easier than ever. All of this illumination does have a hit on frame rate though, as you can see in our 'Scintillating Slideshow' section.

Of course all of this is well and good, but it is the addition of more dynamic aircraft that adds much to the atmosphere. Taxiing around LHR reveals a fleet of local airliners, from British Airways and Virgin Jumbos to smaller 737-fry weaving their way in and out of the traffic. While there are plenty of aircraft around the airports, there is a distinct lack of ground vehicles scuttling around, as we've seen in other add-ons such as Fly Lauda and Schiphol.

If you have the horsepower, then the visual rewards are astounding

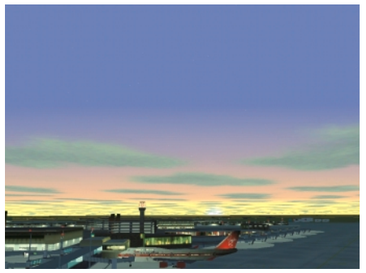
Airport 2000 Volume 2

Are we there yet, are we there yet, are we there yet?

HEATHROW

For flyers who want a bustling, busy airport they need look no further than our very own London Heathrow. Officially the busiest airport in the world, some of the statistics are truly astounding:

- It may have only two runways, but they handle over 1000 flights every day
- From a mere 63,000 passengers when it opened in 1946, LHR now handles around 60 million travellers a year, and a million tonnes of cargo to boot
- A tenth of the global 747 fleet passes through Heathrow every day
- Over 90 airlines fly out of LHR to almost 200 destinations worldwide
- Heathrow employs over 56,000 people, and contributes billions of pounds to the UK economy every year
- The controversial Terminal 5 will help LHR cope with the projected 80 million passengers due to pass through its doors in 2013



London Heathrow in all of its majesty

The other airports have the same unerring attention to detail. The delightful Mediterranean setting of Nice and Barcelona provides a less crowded base of operations, although they still have runways long enough to take some hefty airliners. Indeed, the continental architecture at these two more modern airports are worthy of awards, as is their recreation here. Dynamic scenery is again plentiful, with more regional wildlife, like the BAe 146/Regional Jet 85, Air France and Iberian liners.

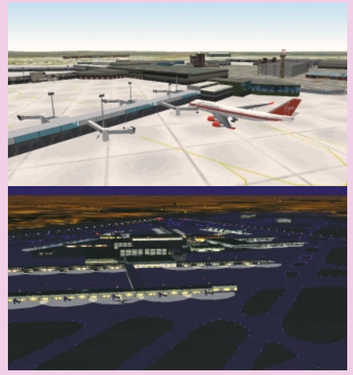
Stateside, Chicago O'Hare is Heathrow's equal, looking big, bold and beautiful in a concrete sort of way. The hemmed-in triangle of Boston Logan sits in front of the splendid backdrop of downtown, while Miami International provides a splendid gateway to the Caribbean. Amsterdam Schiphol completes the set, with its spidery tentacles extending in all directions to its quartet of massive runways.

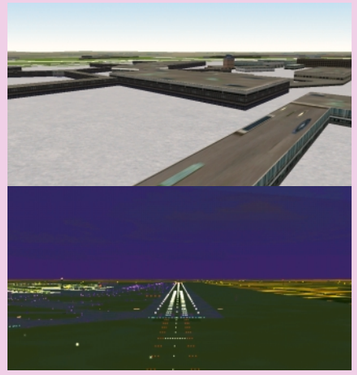
Rather than simply being a scenery add-on, Airport 2000 Volume 2 is a more rounded package. Nine aircraft are included, although this is a little bit deceptive. Three of those are repainted 737-300/400/500 airliners from KLM, Virgin Express and US Air. Before jumping to the conclusion that this is a rip-off, the new zoomed-out photo-realistic panel displays look considerably better than the default ones, even though the gauges themselves are the same and can be a little small to actually read. Similarly, the King Air 350 Business has a new cockpit complete with weather radar. For owners of FS2000 Standard Edition, this is a good way to discover the joys of the Beechcraft without forking out for the FS2000 Pro Edition.

The short take-off and landing (STOL) BAe 146/RJ85 is a great little city hopper,

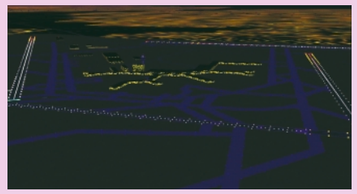
DOUBLE TAKE

For all of its performance problems, Airport 2000 volume 2 does provide an incredibly visual experience, as promised. See the difference here. What you have to ask yourself is whether this level of detail is worth the penalty in framerate?



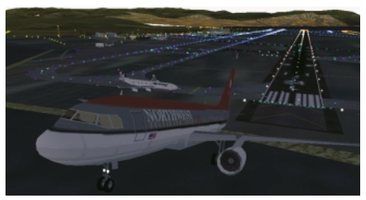


Heathrow by day and by night. Either way, Airport 2000 vol 2 is uncannily realistic



The night lighting effects add a new dimension

FS98 looks every bit as good as FS2000, but the frame rate is just as bad too

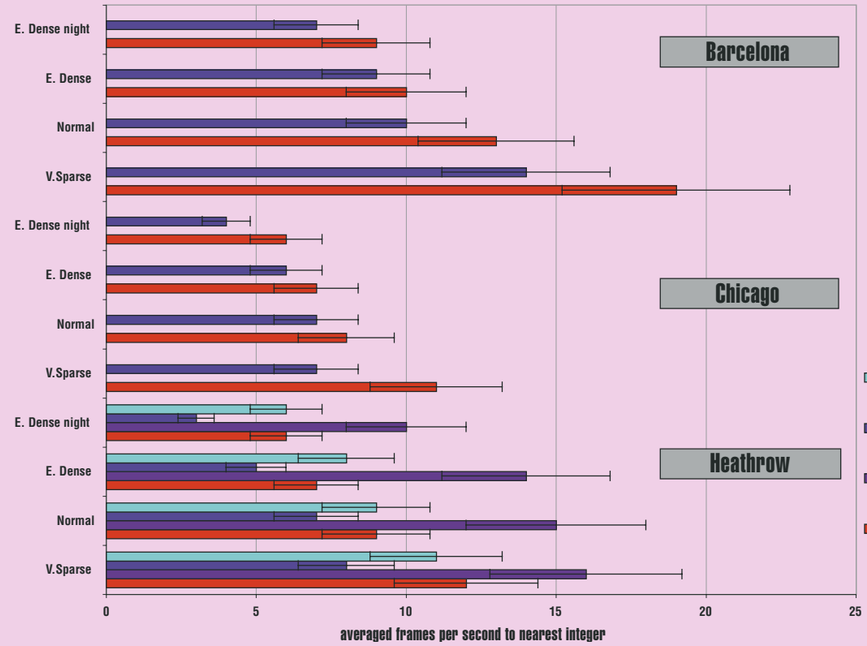


Au revoir Côte D'Azur

Watch out for traffic, the new dynamic scenery provides plenty

The nippy BAe 146 Regional Jet is great for little jaunts

SCINTILLATING SLIDESHOW



Test system
Celeron 300/450MHz
Abit BH6 motherboard
128Mb RAM
16Mb Voodoo 3 3000 PCI
Soundblaster Live 1024

FS2000 Settings
1024 x 768 in 16 bit colour
Visibility 20 miles
Texture detail = 3
Extra graphic effects off
All other settings at 50%

As we all know, FS2000 is a real CPU hog, although it is flyable when you find the right settings for your system. The biggest worry with detailed add-ons such as Airport 2000 Volume 2 is that frame rates will plummet further, turning photo-realistic scenery into a slideshow. With this in mind we have run a comprehensive series of benchmarks to quantify this effect, and most importantly to help you judge if it will run acceptably on your system.

To run the benchmark we flew circuits around Barcelona, Chicago O'Hare and London Heathrow. The frame rate figures are an average for a whole flight. Note that the instantaneous rates reported by FS2000 (hit SHIFT-Z twice) varied noticeably, so we've included error bars (the thin lines on the chart) to indicate the level of deviation recorded.

The Very Sparse setting had no Dynamic Scenery, while for the others the level was set to match the detail level. For these tests we kept the visibility at 20 miles, but significant increases in performance can be gained by reducing this to 10 miles.

The results are interesting. Heathrow is incredibly detailed and big. The frame rates for the default scenery are barely acceptable on the Celeron 300 (but okay with visibility at 10 miles, not shown). When we switch to Airport 2000 Volume 2 the effect is catastrophic, only reaching around 8 fps when set to Very Sparse with no Dynamic Scenery.

Over-clocking the CPU to 450MHz is a real boon (see footnote), with the frame rate scaling more than simply extrapolating by the clock speed would suggest for the default scenery. With Airport 2000 Volume 2 the increase from 300MHz to 450MHz is less effective, but more in line with the clock speed ratio. The bottom line is that it seems you need the 450MHz processor to get close to reasonable performance for the Heathrow scenery with this add-on.

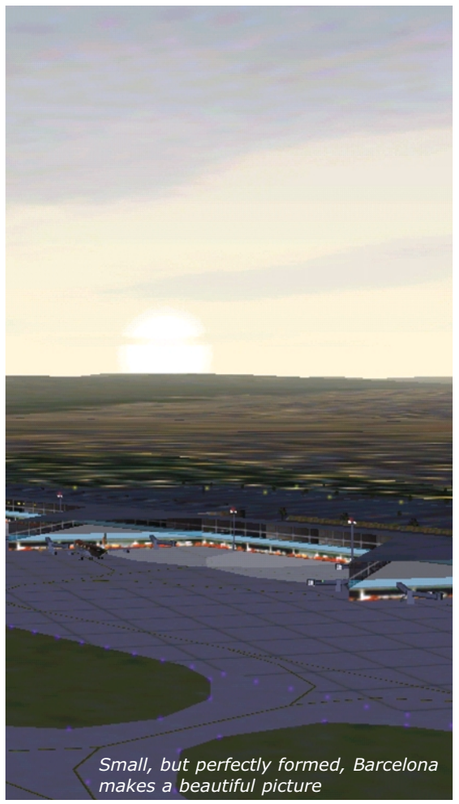
The situation for Chicago is similar, as these two major hubs are about the same size. However, Barcelona is a much smaller airport, with three terminals and just two runways. This makes for a more fluid flying experience, but with the same level of building detail as the other airports. The frame rate around all of the airports in this pack run is determined by their size, and unfortunately for many the worst culprit is Heathrow.

Lining up on the runway at Chicago O'Hare for another benchmark flight

Night time looks fantastic, but is slooooow

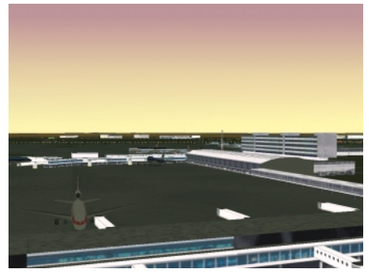
Footnote:
Over-clocking your CPU is a way of getting increased performance by running it at a speed higher than that it is rated for. However, you risk serious damage to your PC. Don't do it unless you are an experienced user and don't mind blowing up your machine and losing everything on it if it all goes wrong - we're not joking! For more information about over-clocking try www.anandtech.com. **PC Pilot cannot be held liable for any damage caused by attempts to over-clock your PC.**

Some fine cockpit panels are included with the new aircraft



Small, but perfectly formed, Barcelona makes a beautiful picture

Boy does that night lighting look good



Amsterdam basked in soothing pastel pink, all that's missing are the tulips

Miami Vice, with a little help from Branson and Co.

which can be loads of fun trying to spot on miniscule runways. Two 767s, a NorthWest Airbus A320 and the infamous Wilco MD-83 (in glorious yellow paintwork) complete the mix for ferrying passengers between hubs. All of these fly nicely, although their exterior work is a bit more jagged than the default FS2000 renditions.

To add some structure to the proceedings there are ten adventures, three of which link up with airports from Volume 1. These cover the entire flight, from engine startup and switching on the no smoking and seat belt signs, right through to gate docking and engine shutdown at the other end. The whole set of procedures is made easier by a helpful co-pilot who announces checklists, tunes the radios and calls speeds and altitudes during take-off and approach. The experience is absorbing, but may be tedious for those not interested in the intricacies of airliner operation and just want to get up there and fly.

We have mainly concentrated on how the airports and aircraft appear in FS2000. For FS98 owners the quality is remarkably similar to that in the new version. It's no free lunch though, as frame rates are similarly crippled. Amazingly, FS98 ran at almost identical framerates to FS2000 under Airport 2000 Vol 2. Depending on which way you look at this, it's good and bad. For FS2000 owners it means you can experience this add-on knowing that you'd be no better off had you not jumped for the latest Microsoft Flight Simulator version. The flipside is that FS98 owners used to blistering frame rates will be horrified by the degradation in performance.

In fact, as you can see from our tests, the question is not whether Airport 2000 Volume 2 is a good product. It is. The issue is will your PC cope, or buckle under the strain? If you're lucky enough to have a monster simulator engine then this is add-on is a real treat. ■

Kenji Takeda

REVIEW SCORE:

Publisher:	The Associates	**Price:**	£29.99
Website:	www.flightsim.co.uk	**Release Date:**	Out Now
Developer:	Wilco		

Pros: Incredibly detailed renditions of major airports, decent aircraft and meticulous adventures

Cons: Frame rate killer on lesser PCs, in both FS98 and FS2000. Flyers will only fully benefit if interested in airline procedures on the ground

System Requirements: Pentium 200, 32Mb RAM
Recommended: PIII 500, 128Mb RAM, 32Mb 3D graphics card

Smashing the Sound Barrier in the Hunter and Lightning... if I can just find the Mach meter

Patrolling the skies like a trooper, the unmistakable Nimrod

Which way did you say was up?

Practice for the Red Arrows in the comfort of your own home

Royal Air Force 2000

The Boys in Blue

Taking to the skies in a Cessna is one thing, but hopping into the latest and greatest aircraft has always been the preserve of military pilots. With Royal Air Force 2000, The Associates has built on its previous collections of RAF and Luftwaffe aircraft for Microsoft Flight Simulator and Combat Flight Simulator in a big way. Complementing, rather than entirely replacing their previous RAF Collection release, this new package provides an intriguing hangar full of classic aircraft from past, present and future.

The breadth of aircraft types spans the pre-World War II days with the Avro 621 Tutor and wonderful Tiger Moth leading the show. The raw simplicity of these classic flyers makes them alluring for pilots wanting to hark back to the roots of aviation. Being at one with the elements makes a change from the fast jets of today. Unfortunately many of these early specimens lack any guns, making them sitting ducks in Combat Flight Simulator (CFS). They are, however, ideal for sedate sightseeing in Flight Simulator 98 (FS98) and 2000 (FS2000) and their engines have a lovely drone that will warm your heart.

At the other end of the spectrum are the roaring jets of the post-war era. The distinctive Hawker Hunter and Gloster Javelin are expressions of sheer power, with their brute strength propelling them through the sound barrier. These fall behind the legendary Lightning in terms of absolute performance though. Punching past Mach 2 in this flying bullet should be a real highlight, but the flight model here seems rather lacklustre compared with the other available jets. Indeed, the novice Jet Provost provides as exhilarating a ride as its bigger cousin.

Covering the World War II era are a host of single, twin and quad-engined prop legends. Two tweaked Spitfires and a Hawker Typhoon Mark 1B provide some single-engined action, although the Spits are only cosmetically different to the default ones. Much more fun are the De Havilland Mosquito and Bristol Beaufighter, twin-propped and packing a serious punch. The panels on these new aircraft all look splendid; photo-realistic with many displaying wear-and-tear to add to the atmosphere. The gauges themselves are fairly standard, but then again, we wouldn't expect that much variation anyway for this period in history.

Cluttered cockpit or big dials, the choice is yours

For those who prefer a wing full of engines, some venerable beasts are included, such as the Shackleton, Wellington and Halifax bombers. These are animated nicely with opening bomb bay doors and the like. They should help mission designers in their quest for developing all manner of new strike packages to take across the Channel. In FS98/2000 there is a certain delight in touring with these monsters that once ruled the skies. To help with the dial infested panels there is a Zoom feature (known as 'Big Dials') that displays only the primary flight instruments so that you can actually see out of the windshield. This is only available on about half a dozen aircraft though, so trying to find the runway through the glass in some of the fast jets can still be a problem.

Coming up to date is the wonderful trio of planes that any current RAF pilot may have seen throughout their service. The classic Jet Provost must hold a bucketful of memories for all who have thrown it around the skies with abandon. The smoothness of its gait and forgiving dynamics make it a relaxing aircraft to fly. The punchy jet engine certainly can give it a kick though, and it's capable of some classy aerobatic moves. But if it's fancy flying that you're really up for, then there's none better than the T1A Hawk, as sported by the Red Arrows. Painted in glorious red, white and blue colours with a Union Jack tail, this baby can perform almost any maneouvre with ease. For the most modern experience then who can resist the immensely detailed Eurofighter Typhoon, as featured in Luftwaffe Collection. The three multi-function displays are fully functional

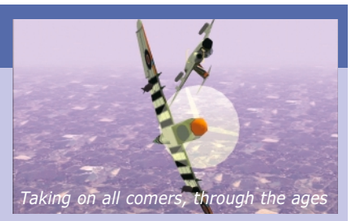
The Eurofighter Typhoon cockpit is as high tech as it gets

CALL TO ARMS

RAF 2000 naturally provides an excellent hangar full of aircraft for Microsoft Combat Flight Simulator. With 21 distinct types spanning several decades around World War II up to the present day there are some interesting match-ups for the adventurous dogfighter to try out. How would RJ Mitchell feel about pitting his Spitfire against the 21st Century Eurofighter Typhoon? You'd be surprised by some of the results, especially when you strip the missiles off the modern day jets. When you only have bullets to spit, the melees even out plenty and there is much fun to be had.

To facilitate this, RAF 2000 has seven Quick Combat set-ups that allow you to pit your wits against waves of aircraft. Rather than being restricted to individual types, collections such as pre-World War II biplanes, 1960's and Modern Aircraft provide several different adversaries in one sortie.

For more organised missions, there is a Campaign set in 1940 that consists of 15 challenging missions. These range from covering the retreat of the British Expeditionary Force to securing the skies over Dunkirk and, surprise surprise, the Battle of Britain. These missions vary in size, with many having relatively few aircraft making them suitable for slower PCs. Be warned though, there are some that are true mayhem and will turn some dogfights to treacle-pace.

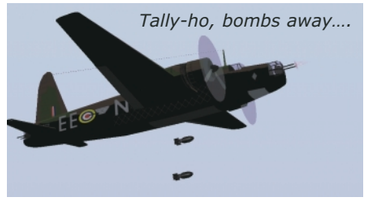


Taking on all comers, through the ages

Let's do the time warp again...

Two engines are better than one, or are they?

The Westland Lysander, stealth technology 1940s style



Tally-ho, bombs away....

and the external detailing is remarkable. Performance is a little dubious in Combat Flight Simulator though, as the flight dynamics modeling may not quite be up to this type of highly unstable, fly-by-wire generation of aircraft. It's great fun taking it up against a bunch of Tiger Moths though, and far from easy given the difference in their flight speeds.

The overall quality of all of the aircraft here is excellent, with some truly stunning cockpit panels to pore over. The external detailing includes some nice animated parts and good geometry detailing. Small features like vortex generators, wing fences and antennae add credence. The texture maps are a little clunky though, especially up close, but are authentic in their markings. Aurally the aircraft are spot on, ranging from the soothing sounds of the Tiger Moth, the mouthy Merlin and the almighty roar of the Avon jet engine. The flight characteristics of the aircraft are generally faithful, although there is some variation in the authenticity. Primarily, we were disappointed with the Lightning, regarded as the 'Manned Bullet' in RAF lore. Here it seems to lack punch and is not as much fun to fly as the apprentice's Provost.

RAF 2000 is a lovely collection of eclectic aircraft spanning over half a century. As a first aircraft collection this package provides enough variety and depth to keep you occupied for months. A downside is that the Tornado is not here, as it is already included on the original RAF Collection, nor are the RAF airfields. The inclusion of CFS missions and Quick Combat setups is a boon, although we did experience some strange 'out of memory' errors on one of our test PCs with the Campaign. For owners of the original RAF Collection it has enough new types to make for some novel flying experiences and CFS mission developers will swoon over the possibilities unleashed here. ■

Kenji Takeda

REVIEW SCORE:	
Publisher: The Associates	**Price:** £24.99
Website: www.flightsim.co.uk	**Release Date:** Out Now
Developer: Blue Arrow/Alpha Simulations	

Pros: An eclectic, yet balanced, mix of aircraft. Excellent panels. Fun Quick Combat and Campaign missions in CFS.

Cons: Chunky textures, lack of guns on biplanes and CFS stability problems. Some of the planes feel a little tame.

System Requirements: Pentium 200, 16Mb RAM
Recommended: PII 400, 128Mb RAM, 3D graphics card

Head to Head in the Clouds

If you are serious about flying or do it for real, then you will appreciate that despite the visual beauty of simulators like Flight Simulator and Flight Unlimited, they have their limitations. We asked Joe Lavery, himself a qualified flyer, to put two IFR (Instrument Flight Rules) packages head to head. If you are looking for serious simulation, then read on.

Fly with the elite…

There's no doubt that Microsoft's Flight Simulator has dominated the amateur flight simulator market since it first appeared in 1984. However, in the realm of professional flight simulators the top of the tree is reserved for Elite (Electronic IFR Training Environment), from Swiss company, Initiative Computing. Originally released in 1990, Elite is now in it's sixth revision and is a simulator that allows you to replicate the instrument panel, avionics and flight aerodynamics of specific aircraft on your PC. It has the facility to practice different procedures under simulated IMC (Instrument Meteorological Conditions).

The program can be supplied in many different configurations, either as software only, or with the addition of associated hardware. This ranges from simply a yoke and rudder pedals, to a full sized throttle quadrant and an avionics panel that would look perfectly at home in a real cockpit. The software option is just as flexible, starting with the basic Elite Pro Trainer that gives you just one aircraft to train on (the C172P in 600 X 800 resolution) to the Elite Personal Simulator Prop package that includes six different aircraft types. Offering more advanced avionics, like Flight Directors, RMI (Radio Management Indicator), HSI (Horizontal Situation Indicator) and a perfect replica of the Trimble 2000 Approach Plus GPS (Global Positioning System), this package is also a requirement if you decide to go on to multi-engine training.

There are other combinations to suit a variety of pockets, including a range of add-ons offering ATC (Air Traffic Control) scenarios, IFR training syllabus and additional navigational data. If you're more interested in becoming a jet-pilot,

Elite 6.0

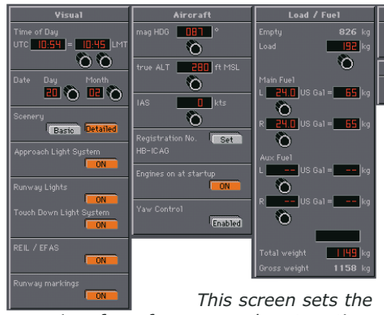
The photorealistic control panel depicting the Cessna 172, complete with GPS

The Archer 3 control panel with the Trimble 2000 GPS

Beechcraft Bonanza A36 photorealistic panel

TRY ELITE FOR FREE

If you want to explore the Elite experience yourself, you can download a fully functional demo version from the Initiative Computing Website – www.flyelite.ch It's a rather large file, but well worth the trouble. Unfortunately the UCI box doesn't compress into a zip file, so you won't have the total experience and will have to make do with the software-only version.



This screen sets the aircraft preferences and system time

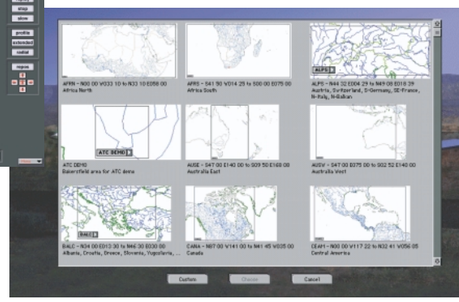
then the Personal Simulator Jet offers the higher speeds and advanced digital guidance systems needed to practice in this sphere of aviation.

The main difference between professional flight simulators and most other products that claim to be so, is that of accuracy. Although the dividing line is getting narrower, most of the fancy external graphics found in nearly all of what might be described as 'leisure simulators', are precisely what stop these programs from performing like real aircraft. Elite, on the other hand, has no such constraints and will happily work on quite modest equipment to provide a realistic and cost effective environment in which to practice your instrument flying.

It's fair to say that Elite would normally fall outside the scope of the casual flyer, not only because of price but also because it is designed for people who want to master IFR flying. The manual states that one of the pre-requisites for using Elite is that you should already know how to fly an aircraft and have a basic understanding of instrument flying. It also warns that Elite is not in itself an instrument-training course, but should be used in conjunction with a recognised syllabus.

The map screen allows you to set-up your training scenario

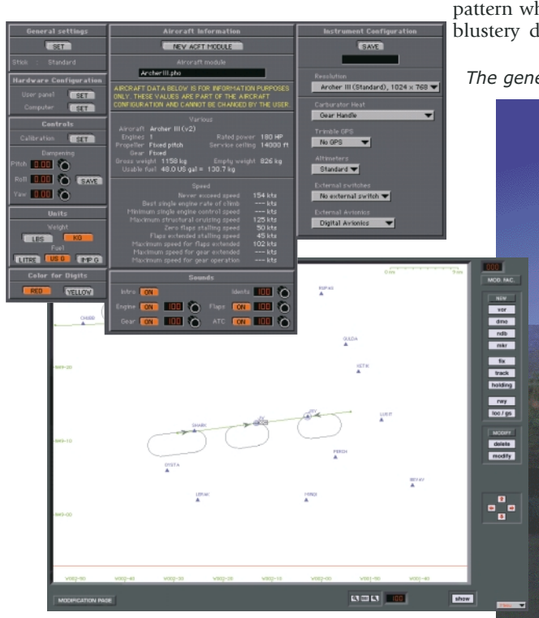
Your choice of navigation database will establish your training area



Consequently, there are no elegant graphics, with just one external view of scenery consisting of runways and very little else. However, the screen shots show that the cockpit displays are beautifully drawn, photorealistic renditions of the real thing, with every switch and instrument operating in exactly the same way as its real world counterpart. For instance, if you've had any IFR experience then you'll already know that NAV instruments get rather twitchy as you get close to the VOR (Very high-frequency Omni-directional Range instrument). What they don't do is thrash about like some demented windmill, as they're depicted in some simulators we've seen. Not so in Elite, where the instrument gets sensitive but reacts as expected. A pilot flying under IFR conditions must concentrate on the current procedure and not be distracted by quirky interfaces and instruments that behave in an unrealistic manner. This is precisely why Elite is found in an increasing number of flying clubs.

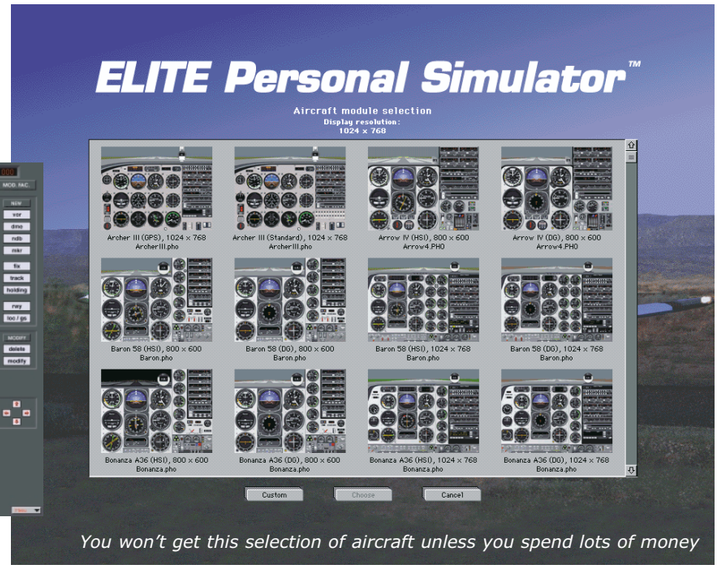
Flying the Elite simulator under IFR conditions is difficult, confusing and strenuous – exactly like the real thing in fact. Trying to achieve a perfect racetrack pattern while holding over a beacon on a blustery day is not that easy. Yet this is what Elite is all about and it's still the only simulator to offer integrated multi-monitor support. The instructor can control all aspects of the student's flight from a separate monitor and has the facility to reproduce every conceivable weather or system condition as well as introducing gradual or total failures in any part of the mechanical or electrical systems.

This level of realism is achieved with the help of a UCI (Universal Control Interface) box. This hardware provides a high fidelity analogue-to-digital connection between the computer, your control devices and the software. It also acts as an effective form of software protection, because the program only functions in demo mode without it. If you're used to conventional software, then the difference the UCI makes is refreshing because the controls react instantly and are absolutely fluid. If you could add the sensory perception of movement it would be perfect… perhaps in version seven!



You have the facility to modify the navigation data

The general settings menu determines the instrument and hardware configurations



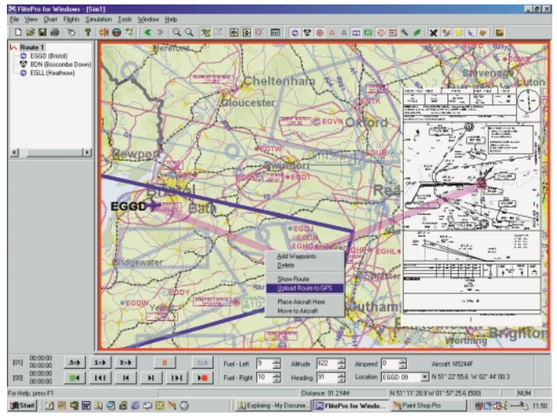
You won't get this selection of aircraft unless you spend lots of money

FlitePro

Under the hood

We remain in the world of professional flight simulators to look at another high profile product. FlitePro is published by Jeppesen who are a familiar and well-respected name in the world of flying and synonymous with quality charts and maps (as used by PC Pilot). This latest addition to their extensive catalogue offers a low priced alternative to the Elite package we looked at earlier, but can it compare in areas that are perhaps more important than the price?

FlitePro provides an IFR (Instrument Flight Rules) training environment that covers much of the same ground as Elite but using the more familiar Windows interface, particularly in the planning and set-up stages. It also includes a separate CD containing Jeppesen's Flightschool This is a multimedia instrument-training course, presented in the form of a series of structured lessons that encompass flight and navigation instruments, weather, airspace procedures, planning, radio navigation and so forth. If you manage to complete this lot you even get a certificate to prove it, but because the program was developed in the USA, the data is slanted towards FAA regulations, which differ slightly from our own CAA.

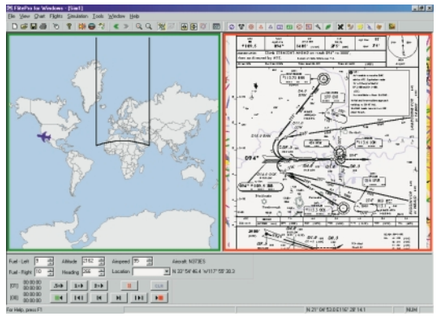


Once complete, your route is uploaded to the on-board GPS

The program is supplied with two aircraft modules: a Cessna 172 and a Bonanza A-36. The Bonanza includes two panels, one with Dual-VOR and the other with an HSI. A simulation of the Apollo GX GPS receiver is also included and like the one provided with Elite, is a fully functional instrument that perfectly mimics its real world counterpart. It incorporates the full Jeppesen worldwide navigational database, so you can use it to fly to and from practically any airport you like.

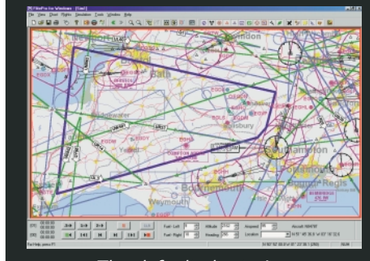
Training flights start from the map screen by selecting the airport you want to practice from, the type of aircraft you want to fly and the other pre-flight planning parameters you need to determine before any flight. This screen also allows you to set the environmental conditions and view the in-built sectional charts, which are provided in vector or raster format (line drawn or colour topographic) and can be displayed as High Altitude En-route, Low Altitude En-route or VFR (Visual Flight Rules).

Creating a flight plan is simply a matter of pointing at the first waypoint and clicking with the mouse, which will automatically lock to the nearest Navaid or airport. You

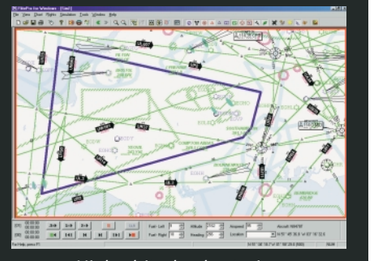


The split screen is useful at the planning stage

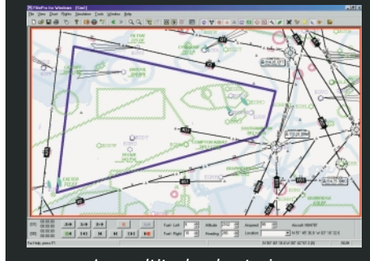
CHART YOUR COURSE CAPTAIN



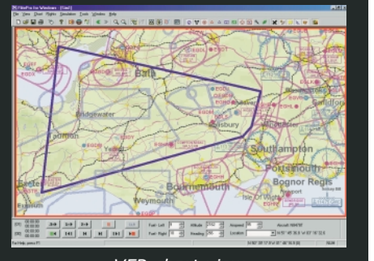
The default chart view



High altitude chart view



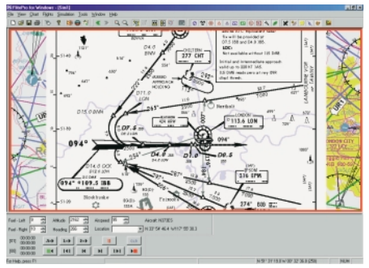
Low altitude chart view



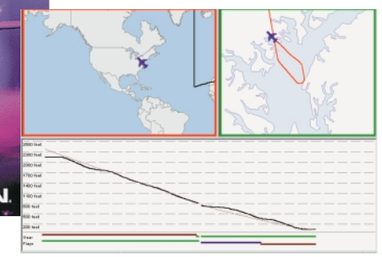
VFR chart view

Once in the cockpit you have to activate the flight plan

The Beechcraft Panel with a typical scenic view of IFR conditions!



You can overlay the approach plates to track your progress



The chart screen can show both the track flown and profile of your approach.

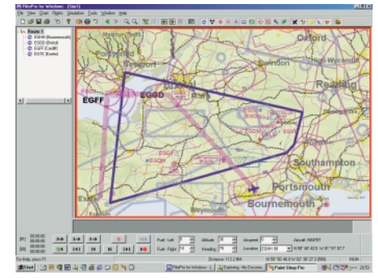
An overview of the southern England chart

This chart shows the runway details; note also the VCR-style playback controls

repeat this process for the other sectors of your flight and end by right clicking on 'Finish'. At this point the plan will be clearly shown on the map and can be uploaded to the Apollo GPS on board the aircraft with one more click.

You begin the flight by selecting the 'go to aircraft' option from the same menu, or by selecting the artificial horizon icon from the toolbar. At this point you'll be placed at the runway threshold of the departure airport, ready for your pre-flight checks and instrument set-up. Once underway you can monitor your progress on the map screen by hitting escape to automatically pause the flight until you return to the aircraft. Upon completion, you can check your approach profile against the correct plot on the graph drawn below the map display.

The FlitePro package also includes ten ATC (Air Traffic Control) flight scripts, to give you realistic ATC communication in the demonstration flights. This interaction is not available for flights you create yourself, but you do have the facility to induce system failures at set times, or as a percentage of reliability to make instrument failures appear at random.



Your planned route is shown in red, also in the 'list' view at the top left

THIS IS SERIOUS SIMULATION

A final thought to remember is that both Elite and FlitePro offer serious training and although they are sold as flight simulators, they are not to be confused with programs like Microsoft's Flight Simulator or Flight Unlimited III. They are no-frills accurate procedural trainers that are not aimed at the VFR pilot, who obviously needs a lot more visual clues for navigation. With IFR training the external view is irrelevant and as long as the runway is where you expect it to be when you reach decision height, that's all that matters.

Conclusion

Choosing between Elite and FlitePro is a little difficult because, although they offer similar features, the implementation they adopt is totally different. Elite definitely has the edge as far as the accuracy of instrumentation is concerned and it also provides much greater control over the environmental and mechanical systems. The realistic flight dynamics, smooth instant reactions from the gauge needles and the facility to use up to three monitors provides, in our opinion, an altogether more authentic IFR experience, particularly when used in conjunction with an instructor.

On the other hand, the FlitePro maps and planning screens underline the origins of its publisher, Jeppesen. Their superb detail even provides on-screen approach plates that can be printed and show your flight track for comparison with the original. However, the instrument screens, although accurately drawn, are not as clearly defined as the Elite versions and do not respond in the same way. Although we had no way of measuring the frame update, the flight model appears to be running a little slower as well and as a result the instruments are not as smooth in operation.

Having said that, FlitePro costs considerably less than Elite and would undeniably benefit someone about to undergo IFR training. It seems you get what you pay for, though what you are prepared to pay is a decision only you can make!

Availability

Both packages can be bought from professional flight gear outfitters, Transair, based at Shoreham Airport in the UK. They offer a worldwide service and can be reached via their website www.transair.co.uk ■

Joe Lavery

ELITE REVIEW SCORE:

Publisher:	Initiative Computing	**Prices:**	
Website:	www.flyelite.ch		£249.95, up to £699.00
Developer:	Initiative Computing	**Release Date:**	Out Now

Pros: Undoubtedly the best IFR procedural trainer available

Cons: The price

System Requirements: Pentium 133 MHz, 32 Mb of RAM, graphics card supporting 1024 x 768 16-bit colour graphics

Recommended: PII 350, 64Mb RAM, yoke & rudder system

FLITEPRO REVIEW SCORE:

Publisher:	Jeppesen	**Price:**	£99.99
Website:	www.flitepro.com	**Release Date:**	Out Now
Developer:	Jeppesen		

Pros: Offers a wide range of training features for the IFR pilot. Reasonably affordable

Cons: Needs a higher frame update for the instruments.

System Requirements: Pentium 200 MHz, 32Mb RAM, graphics card supporting 1024 x 768 16-bit colour graphics

Recommended: PII 350, 64Mb RAM, yoke & rudder system

3 Great Planes Series

FIFTEEN QUID'S WORTH...

The Abacus Cessna 208A Caravan.

The Abacus Cessna 208A Caravan panel.

The Abacus PA-28-140 Cherokee.

The Abacus PA-28-140 Cherokee panel.

The Abacus DHC-6-3 Twin Otter.

The Abacus DHC-6-3 Twin Otter panel.

Aircraft to go

The fact that each successive release of Microsoft's Flight Simulator has included a growing number of aircraft types clearly shows that people like to fly different machines. Simulated or real, entering a new type in your logbook is a bit like cutting another notch in your gun butt and probably explains why aircraft collections are one of the most popular add-ons for Flight Simulator.

Abacus has specifically targeted this market with their latest 'triple' products priced temptingly low. Each title features three different aircraft, complete with panels, claimed accurate flight dynamics and sound effects to match each type.

They are easy, ready to install and on the package we intially tested included the De Havilland DHC-6-3 Twin Otter, Cessna 208A Caravan and Piper PA-28-140 Cherokee. It has to be said that the models for these three are not particularly inspiring and lack the transparent cockpits and other embellishments that we now expect from commercially produced aircraft.

However, the second package in the series contains aircraft for Microsoft's Combat Simulator, with the F4U5 Corsair, P-51 Dakota Kid and Supermarine Spitfire Mk IXb. These are far better than the first pack, incorporating beautifully textured polished surfaces, detailed transparent cockpits (both internal and external) and are a joy to fly.

Although these aircraft are professionally designed and everything they claim to be, we're not sure they represent particularly good value. This is especially true when compared to many of the aircraft add-ons currently available as these usually contain at least a dozen or more aircraft. Indeed, when up against some of the excellent models available free from websites like www.avisim.com and www.flightsim.com they begin to look rather expensive. To highlight this point we decided to have a scout round the latest uploads and make a direct comparison with aircraft and panels of the same civilian models that we acquired for the price of a 30 pence phone call logging onto the Internet, per plane.

We found a good example of the Cessna Caravan from Daniel Gazzano, with a panel to suit designed by David Durst. A relatively new upload at www.avisim.com, produced the Piper Cherokee and although not exactly the same model, it served to illustrate our point. Finally, the DHC-6 Otter seems to be a popular subject with over twenty examples to choose from. For overall looks and design features we decided on the Greenland Air model from Barry Blaisdell, combined with a panel from Cornelio Cornelius and friends.

We reckon you'll get far more fun and a lot more aircraft of equal quality for 15 pounds-worth of local calls, by following Mike Hambly's guide to the best of the web in this and the previous issue of PC Pilot! ■

Joe Lavery

OR HOW ABOUT THESE FOR FREE?

Unusual choice of colours on this Cessna 208 Caravan from Daniel Gazzano.

The Cessna 208 Caravan panel from David Durst is one of the clearest panels we've seen.

This Cherokee from Barry Ellis even has a step panel on the wing.

There are removable control yokes on the Cherokee panel from J. L. Stubbs.

Lots of fine detail on the Ice Patrol DHC-6 Otter by Barry Blaisdell.

Although based on the same aircraft, the Otter panel from Cornelio Cornelius is somewhat different to the Abacus version.

REVIEW SCORE:			
Publisher:	Abacus	**Price:**	£14.99
Website:	www.abacuspub.com	**Release Date:**	Out Now
Developer:	Various		

Pros: Yet more new aircraft for Flight Simulator 2000 and Combat Simulator...

Cons: Rather pricey for only three planes. Can find equally good models online.

System Requirements: Pentium 300, 32Mb RAM
Recommended: PIII 550, 128Mb RAM, 16Mb 3D graphics card

PULLOUT SECTION

Jeppesen Charts — Glossary, part II

Compiled by Mungo Amyatt-Leir

Continuing from the pull-out section in Issue 3, we present part two of our guide to Jeppesen low-altitude en-route charts. To help you interpret the multitude of symbols used on these and other Jeppesen charts we've put together this two-part pull-out and keep glossary. Please also refer to the glossary at the back of the magazine for explanation of common acronyms. If you missed the last issue, do not despair as a back-issue may be available, contact us through www.pcpilot.net for details.

JEPPESEN

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THESE CHARTS ARE NOT TO BE USED FOR REAL WORLD NAVIGATION.

ALTITUDE LIMITS AND TYPES OF CONTROL

4000
CTR, ATZ, TIZ

CTR-Control Zone
ATZ-Aerodrome Traffic Zone
TIZ-Traffic Information Zone

FL 360
UTA

UTA-Upper Control Area
TMA-Terminal Control Area

FL 70
4000 TMA

OCTA-Oceanic Control Area

BOUNDARIES

ADIZ, DEWIZ and CADIZ

FIR, UIR, ARTCC or OCA boundary.

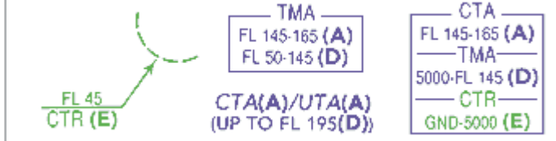
International boundary

Time zone boundary.

QNH
QNE

QNH/QNE-boundaries

ICAO AIRSPACE CLASSIFICATIONS



Airspace classification is designated by the letters (A) through (G). Classification (A) represents the highest level of control and (G) represents uncontrolled airspace. The airspace classification letter is displayed in association with the airspace type and vertical limits.

AIRWAY AND ROUTES CENTRELINES

Airway /Route

Diversionary Route, Weekend Route (Europe)

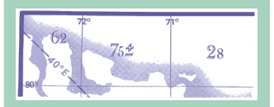
LF Airway

Overlying High Altitude Airway/Route

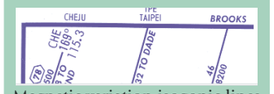
OTR
Oceanic Transition Route

RNAV Airway/Route

ORIENTATION



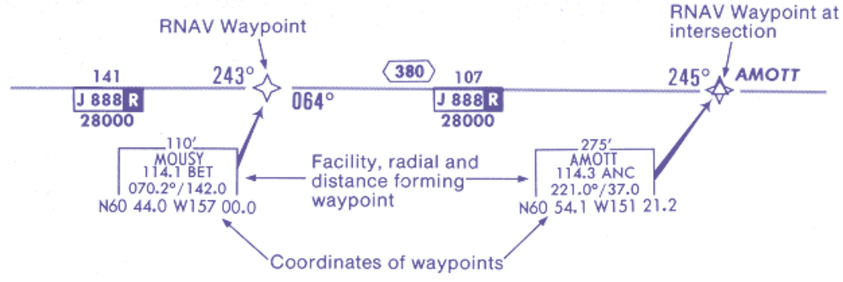
Grid shown at the intersection of units of latitude and longitude or by complete line.



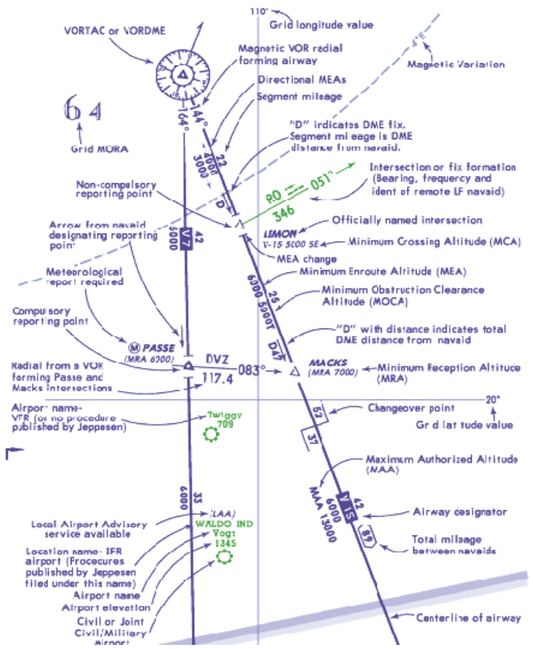
Magnetic variation isogonic lines are indicated at the edge of the chart or are extended fully across the chart in a continuous dashed line. Shorelines and large inland lakes are shown.

Grid Minimum Off-Route Altitude (Grid MORA) in hundreds of feet provides reference point clearance within the section outlined by latitude and longitude lines. Grid MORA values followed by a ± denote doubtful accuracy, but are believed to provide sufficient reference point clearance.

USA SERIES 800 AND 900 DESIGNATED RNAV ROUTES



ENROUTE CHART EXCERPT

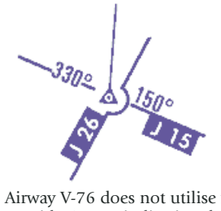


AUSTRALIA AND CANADA T RNAV ROUTES

AIRWAY NAVAID/REPORTING POINT BY-PASS

When an airway passes over or turns at a navaid or reporting point, but the navaid is not to be utilized for course guidance and/or no report is required, the airway centreline passes around the symbol. In cases where a by-pass symbol cannot be used, an explanatory note is included.

Airway J-26 does not utilise the navaid or reporting point.



Airway V-76 does not utilise the navaid. A note indicating the proper use of the navaid is included.

Airway J-14 turns at the navaid or reporting point but does not utilise them. A mileage break "X" is included to further indicate a turn point.

Airway V-76 does not utilise the Intersection. A note indicating the proper use of the Intersection. is included.

CONTROLLED AIRSPACE

Controlled airspace shown in white.
Uncontrolled airspace shown as a tint.

Controlled airway/route.

Uncontrolled airway or advisory route.

Control Area boundary within controlled airspace (CTA, TMA).

USA Class B airspace. Waffle screen shows lateral limits.

Radio Frequency Sector Boundary.

Radio boundaries of control or service unit.

Boundaries within TMAs or CTAs defining different altitude limits and/or sectorizations.

USA special VFR weather minimums for fixed wing aircraft are not authorized within the lateral boundaries of the surface areas of Class B, Class C, Class D, or Class E airspace designated for an airport.

Control Zone or Aerodrome Traffic Zone (controlled).

Aerodrome Traffic Zone (no control). Aircraft broadcast intentions on standard en-route frequency, and listen on same when within such zones.

Japan Information Zone (no control) within which special VFR may be cleared by an air-ground station.

USA Class C airspace.

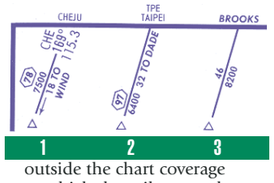
Canada Class C airspace.

BORDER INFORMATION

This area overlapped by chart indicated.

1. Name outside the border is the next airway navaid to which the total mileage is given. Navaid identification is shown on all charts except the US(LO) and Canada/Alaska chart series. Reporting point name is shown when it is the airway termination.

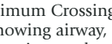
2. Name inside the border is the first reporting point outside the chart coverage to which the mileage and MEA are shown.



3. Airway lead information - the frequency and identifier of an off-chart navaid are shown when the navaid designates an on-chart reporting point, changeover point or course change.

FIXES

Compulsory Reporting Point



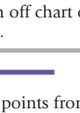
Non-Compulsory Reporting Point

Low Altitude Compulsory Reporting Point

Low Altitude Non-Compulsory Reporting Point.

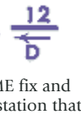
Mileage Break/Turning Point

Meteorological report required (unless instructed otherwise), giving air temperature, wind, icing, turbulence, clouds and other significant weather. Report to controlling ground station, or station indicated.



Holding pattern. DME figures, when provided, give the DME distance of the fix as the first figure followed by the outbound limit as the second figure.

Length of holding pattern in minutes when other than standard.



NavData identifier [in square brackets] is included when the fix or mileage break is unnamed, or named with other than a five character name and no country assigned identifier. Its use is to assist the pilot with an on board NavData database to associate database information with chart information. The fix officially named '115°W' is carried in the database as '11YEU'). NavData identifiers are Jeppesen derived only, and should not be used for ATC flight plan filing or used in ATC communications.

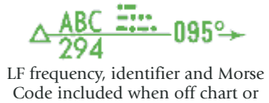
Fix name with Minimum Crossing Altitude (MCA) showing airway, altitude, and direction, and Minimum Reception Altitude (MRA).

Official fix name (with country assigned identifier in parentheses). Several countries throughout the world assign identifiers for use in flight plans.

LF bearings forming a fix are to the navaid.

VHF radials forming a fix are from the navaid.

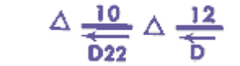
VHF frequency and identifier included when off chart or remoted.



LF frequency, identifier and Morse Code included when off chart or remoted.

Arrow along airway points from the navaid designating the reporting point. Other published radials may be used if they are greater than 30 degrees from the airway being used and are not beyond the COP.

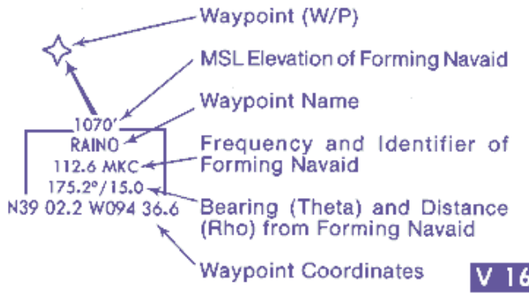
Fix formed by 55 DME from MAZ navaid.



"D" indicates DME fix and distance from the station that provides the DME mileage.

A-Amber. Some countries use the phonetic alphabet in lieu of 'coloured' designations, as Alpha in lieu of Amber, Golf in lieu of Green, etc.

ADR-Advisory Route,
AR-Atlantic Route, Canada Alpha Route



Airway and route designators. Negative (white letters in blue) designators are used for distinction.

ATS-Designated route without published identifier

AWY-Airway

BR-Bahama Route, Canada Bravo Route
B-Blue, Bravo

Direct Route,
D-(suffix) Advisory service only

DOM-Domestic Route. Use by foreign operators requires special authorization.
F-(suffix) Flight Information

G-Green, Golf
GR-Gulf Route
H or HL-High Level
J-Jet
L-(suffix) L/MF airway

NAT-Route associated with the North Atlantic Organized Track structure.

OTR-Oceanic Transition Route
PDR-Predetermined Route

R-Red, Romeo

R-(suffix) RNAV route
RR-Canada Romeo Route
SP-Supersonic RNAV route

U-Upper
UL-(prefix) RNAV route

V-Victor
V-(suffix) VOR airway
W-White, Whiskey

One Way Airway

Suffix 1 or 1, 2 or 1, 2, 3 gives the Conditional Route Category (Europe).

MEA (Minimum Enroute Altitude), shown as altitude or flight level.

Metric MEA converted to feet using standard altimeter setting.

On some chart series, altitudes are provided in both feet and metres. The letter 'm' following an altitude in italic type is the metric altitude.

MEA is established with a gap in nav-signal coverage.

Directional MEAs as indicated.

FIXES continue overleaf

1300T

MOCA (Minimum Obstruction Clearance Altitude).

1300a

Route MORA (Route Minimum Off-Route Altitude). See glossary.

MAA 25000
MAA FL 240

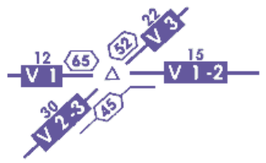
MAA (Maximum Authorized Altitude), shown as altitude or flight level.

⊣ ⊢

MEA change, limit of MAA applicability or MAA change. Also MOCA or MORA change when MOCA or MORA is charted with no MEA. Symbol is omitted at navaid.

PPR

Prior Permission Required from ATC for flight in the direction of the arrow.



Mileages. Total mileage between navaids (in hexagonal box) is positioned along respective airway centreline. Total mileage may have directional pointers when there are multiple airway designators. The pointers parallel the airway centrelines along which the mileage applies.

137°

VOR radial & route bearings (magnetic).

137°T

VOR Radial and route bearings (True in the Northern Domestic Airspace of Canada).

279°
279°T

ADF Bearings (inbound or outbound). Bearings are magnetic unless followed by a "T" indicating True. ADF Bearings include an arrow to indicate the direction of flight or, when used to designate fixes, direction to the station. In remote or oceanic areas where ground based navigation aids are not available, the arrow indicates the direction of flight.

266°T
086°T

ADF bearings (true at track midpoint in the Northern Domestic Airspace of Canada).

The navigation frequency COP (changeover point) between two stations is indicated by mileages from the station to the point of change. Omitted when at midpoint or turning point.

E>

Means even thousands altitudes/flight levels are used in the direction of the arrow and odd thousands in the opposite direction. For application of this symbol above FL 290, the flight levels 310, 350, 390, etc. (left half of the cruising level rose) are considered even. The symbol is shown where altitude/flight level assignment is opposite that shown in the standard cruising altitude/flight level rose.

E&O>

Means all altitudes, even and odd, are available in the direction indicated.

O>

Means odd thousands altitude/flight level per the above definition. 'O' is used only on one way airways to show that odd altitude/flight level assignments apply.

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Nuzzling up to the automatic docking gate at Dusseldorf

German Airports 3

Now this is as Real As It Gets (again)

Each revision of Microsoft's Flight Simulator includes a bit more scenery for the VFR (Visual Flight Rules) flyers, who like to fly their adventures the hard way, i.e. using the Mk. 1 eyeball. Unfortunately, while most of the flight simulator world is now covered, the detail level is still sadly lacking. This applies even more to the areas we tend to see most of, namely the airports.

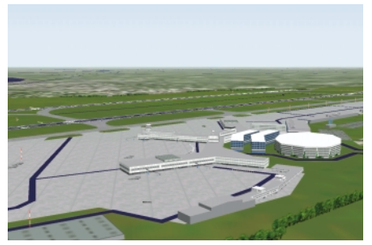
In an effort to improve matters Aerosoft have just re-released German Airports 3 (originally reviewed in Issue 1) for Flight Simulator 2000 – apparently now taking advantage of all that this has to offer (except its slow frame rates we hope!). As before, eight German airfields are provided, courtesy of Thomas Hirsch and Peter Hiermeier, the two scenery designers responsible for the incredibly detailed series.

The airports covered are Düsseldorf, Mönchengladbach, Erfurt, Bremen, Hamburg, Berlin-Tegel, Kiel and Lübeck. They are all detailed to a high degree, with huge glass fronted terminal buildings in the larger airports that are not simply bitmaps applied to square blocks. In most cases the glass is transparent allowing you to see the inside detail of the building. The tunnels used to transport the passengers from the terminals to the aircraft are accurately shaped, right down to the cantilever arms that extend onto the aircraft. Like their two previous products, German Airports 3 incorporates a fully working docking system that will guide your aircraft right up to the terminal. There are other animated features throughout the package, including hangar doors that open automatically, rotating radar dishes and plenty of static objects to bring the airports to life.

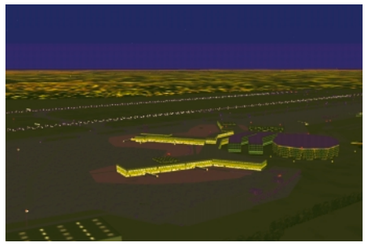
Overflying the larger fields at night is actually more impressive because our perception of detail is much less under low light conditions. Consequently, your eyes are fooled into seeing more detail than really exists. The fact that all the runways and taxiways light up like Christmas trees certainly helps to sustain this illusion. As you would expect, the approach lights for each airfield are accurately represented, as well as the other Navaids (ILS, VOR/DME, NDB, and ATIS) for instrument approaches.

German Airports 3 again impresses in its Flight Simulator 2000 outing, with reasonable frame rates given the complexity offered. The package comes with a good assortment of maps and charts and is a worthwhile addition if you fancy more detailed German flying. ■

Joe Lavery



Overflying the airfields in Flight Simulator 2000 surprisingly doesn't affect the frame rate that badly.



The same view by night

The detail level is superb, as this illuminated sign on top of the terminal building in Dusseldorf shows.

Our BA Airbus A320-200 model touches down at Bremen (aircraft designed by Andrew Richard, and can be found at www.avsim.com)

Waiting for taxi instructions at Mönchengladbach

On finals into Berlin

You can see the realistic transparent terminal windows as we taxi to the gate

REVIEW SCORE:

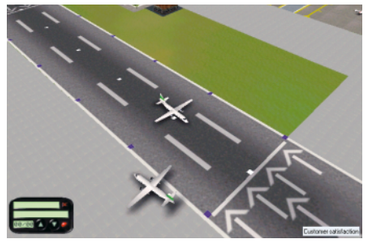
Publisher:	Aerosoft GmbH	**Price:**	£24.99
Website:	www.aerosoft.de	**Release Date:**	Out Now
Developer:	Thomas Hirsch and Peter Hiermeier		

Pros: Adds a detail level that hopefully will one day cover the whole Flight Simulator world

Cons: Can be a bit processor hungry

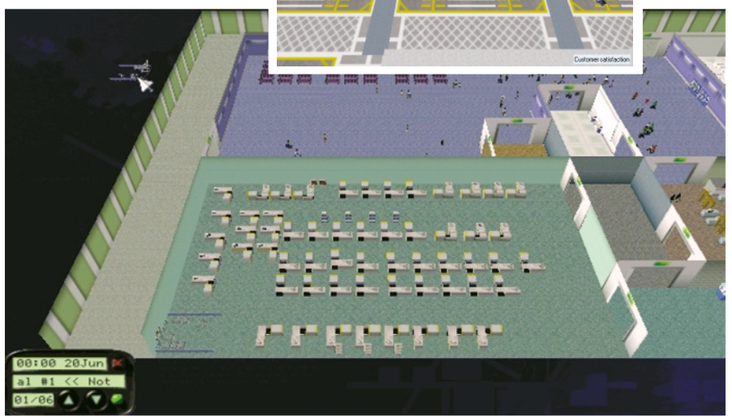
System Requirements: Pentium 233 MMX, 32Mb RAM
Recommended: PIII 550, 128Mb RAM, 16Mb 3D graphics card

Airport Inc



Make sure the taxiways are clear, or traffic jams will snarl up your operation

The air stands and taxiways are teeming with life – but only occasionally



Rack and stack the check-in desks. Furniture placement makes little difference in the terminal, which is wholly unrealistic

Last Call for Flight PCP4

Keep an eye on the comings and goings to pinpoint problems before they blow up

Soaring the skies like a bird may be the ultimate thrill for pilots, but for those whose flying is restricted to the back of the cabin, it's the airport experience that makes or breaks a holiday. Airport Inc puts that responsibility squarely onto your shoulders - keep the flyers happy or see your business spiral into the ground in flames. So it's time to dig out those Jeremy Spake Airport tapes and start laying down that runway.

The manual that comes in the box covers the user interface well, but falls well short of providing any detail for building and running the airport. The interactive tutorial does a much better job and is most welcome, as this is certainly no simple sim. Thankfully, the user interface is intuitive, with a single icon bar at the top of the screen with a pager and status bar at the bottom to keep you abreast of news as it breaks.

Starting choices are easy; just pick a city for your airport to serve, from one of the 75 on offer. Each location has its own characteristics, in terms of potential domestic and international flights, weather and natural disasters. Regionalisation extends to the airlines that will fly out of your airport, although this doesn't actually affect the gameplay in any other way.

Things start to matter more at the next stage - deciding exactly where to site your new development. Miles from the city, land is cheap, but will your passengers be willing to travel that far? On the easiest level this has no bearing on the game, but on difficult ones you have to think about your tighter budget more carefully. You don't have to buy all the land up front either, as you can option adjacent plots for a fee or simply wait and expand when your cashflow becomes more buoyant.

After the initial property prospecting it's time to fire up the bulldozers and start mixing the concrete. You're given the chance to build the basics before throwing open the doors for your first paying customers. Be careful not to spend every penny up front though, as taxes and running costs all have to come out of the same pot, and the staff won't be happy if you can't pay them at the end of the month.

On the easiest level, the terminal buildings come pre-fabricated, which is a real godsend. Or you could go for a cargo only facility, in which case the steel sheds need to come out. Slapping down the main building, control tower and fire station are a priority, together with some car parking to get you going. Then it's onto the tough questions. Choosing which runway to build will severely affect the business you can pull in. The 1,000m strip may be cheap, but don't expect many Boeings to use it. The 3,000m runway will take all comers, but you'll still be restricted by the number of slots it can handle, so compromise and forward planning should be carefully considered. Erect some plane stands by the terminal, connect it all up with some taxiways and hey presto, one airport.

After the flurry of activity and excitement of seeing your new creation rise from the ground it's time to sit and wait. Game time can be sped up and slowed down, but now's a good time to flick through the manual as it seems to take an age before anybody shows any interest in your sparkling new architectural tour de force. Be grateful of the lull though, as once business starts coming in there is little time for rest.

The first indication of good news is a bleep from your pager at the bottom of the screen. Clicking on the flashing red button pulls up the contracts screen, which is where all of the wheeling and dealing takes place. Before any planes actually use your airstrip you have to agree on a Master Contract with the airline. This is the critical stage of negotiations as your revenues are determined by landing fees, passenger taxes, maintenance and cargo storage charges collected by you. Airlines will almost always try to pull a fast one and rip you off, so stick to your guns. The boost in profits over the multi-year contracts can far outweigh any

MONEY, MONEY, MONEY

Hard-nosed negotiations are needed for the Master Contract, or you'll be in trouble

Relive those disaster movie moments in the control tower view

Don't work the staff too hard or disaster will strike

Flight contracts will come rolling in once you're airport has all mod cons

At first there's plenty of room for everybody…

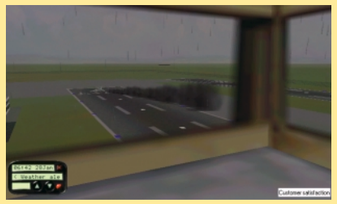
But it soon becomes like a game of Tetris juggling runway slots

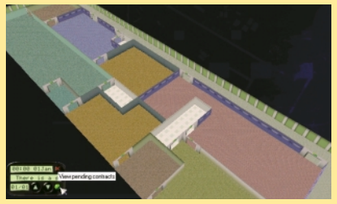
Be a good boy or girl and the industry will award – it's not quite the Oscars but it'll do

If it all comes together then that red line will keep heading skywards

THE DIRECTOR'S CUT

Airport Inc is the first Sim-type game to feature a full 3D graphics engine, albeit restricted to 640x480 resolution. You can rotate, zoom-in and even hop into a taxi or follow a passenger around the terminal for a punter's-eye view. The control tower is an ideal place to watch the comings and goings and listen to the air traffic control banter over the airwaves. Unfortunately it is only possible to play the game from the general view though, which can be annoying.





Keep the passengers busy and rake in some extra cash in the retail mall

Adjust each building's funding level and staff discipline levels to maximise profit and throughput, but be careful

Keep an eye out for new available goodies, like bigger and better airport buildings – Woooo!

lost revenue from losing a couple of cheapskate operators who would only clog up the runways anyhow. Aviation may be fun, but a cutthroat attitude is necessary in this game if you're going to get anywhere.

Once that lucrative Master Contract has been signed the airline will offer up individual flight plans for approval. You can simply accept these, or look at how this fits in with the existing runway schedule. Sandwich too many movements together and your ground crew won't be able to cope, leading to delays and all manner of grief. Shunting take-offs and landings can alleviate this pressure, as can switching the plane to another runway. The airlines may not be too chuffed though, especially if it forces more problems at the other end of the journey.

Offers for hotel chains, shops in your terminals and petrol stations help provide more lucrative money-making opportunities. Building up your airfield will attract more carriers, with the option to eventually become a major hub.

Rapid expansion has its problems though.

As footfall increases you may find your pager flashing incessantly, warning of a lack of car parks, baggage carousels, x-ray machines, petrol stations - you name it. Keeping the punters fed, watered and above all happy, increases in difficulty at an almost exponential rate. Add to that severe weather, terrorists and freak accidents and your world can explode into a world of chaos if you're not careful.

Activity at the airport does fall a little short of bustling, as the air and passenger traffic is only a representation of the actual traffic. However, aircraft come and go regularly, taxiing to the gates to be swamped by a flurry of support vehicles. Cars, buses and taxis populate the surrounding vehicular arteries, and passengers swish through the terminal.

If this all sounds complicated, then that's because it is. Airport Inc is most reminiscent of the Sim City series of games. Detailed in all areas, it aims to be comprehensive at the expense of frivolity.

The goal is to make more money and handle more passengers. That's it. There are a few set pieces, but the aim is the same. Getting to grips with the intricacies of contract dealing, airline logistics and road planning is the most stimulating part. Unfortunately, the lack of real rewards means that the game flags once the basics are mastered. Playing on the harder levels is much more challenging, but still limited. There are also several annoyances that hinder gameplay. For example, check-in desks can only be assigned to airlines one by one and taxiways must be laid square by square. Also, the positioning of terminal furniture has no effect on the game, as long as doorways are not blocked. Passengers don't interact with any objects either, so the interior design exercise are rather superfluous.

Airport Inc is an ambitious product that succeeds in capturing the multi-faceted nature of running an airport. It is by no means perfect, with several niggles that diminish the playing experience. It also has a rather straight-laced approach. As with the Sim City games, the biggest problem is that once you have managed to build a few large, successful airports there is little urge to do it again. That said, until you can finally crack it, this is a hideously addictive game. ■

Kenji Takeda

REVIEW SCORE:	
Publisher: Take 2	**Price:** £29.99
Website: www.take2games.com	**Release Date:** Out Now
Developer: Krisalis	

Pros: A comprehensive sim-game, with a nice 3D graphics engine, user-interface and balance. Hideously addictive.

Cons: Limited to 640x480 resolution, making it look chunky. It can chug on slower PCs. The objectives are too vague and humour is severely lacking, ultimately limiting the fun factor.

System Requirements: Pentium 200, 16Mb RAM, DirectX 7 sound/video cards.
Recommended: Pentium II 400, 64Mb RAM, 16Mb 3D graphics card

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You wouldn't normally expect to see the F-100 taking off from a grass strip.

The mighty Vulcan is without a doubt the most famous of the V bombers. Seen here waiting to go into action.

After a successful mission why not do a little sightseeing? A trip down the Thames past Tower Bridge

Air Power - Cold War

The Dawn of the Jet Age

This low level shot captures the huge expanse of that delta wing.

The Super Sabre goes head to head with a Messerschmitt

Many of us remember with affection the early jet fighters and bombers that were the foundation of the modern Royal Air Force. These aircraft are as much a part of our heritage as the ruined castles and monuments strewn around the countryside. Sadly, the majority of these once proud flying veterans have suffered a similar fate and if they've survived at all, they often lie forgotten in the corner of some field or hangar, untended and unloved.

However, it appears that the flight simulation fraternity are determined not to forget them, as relative newcomer Alpha Simulations are about to release a package dedicated to the aircraft of this era called Air Power - Cold War. It's basically an aircraft add-on for Microsoft's Combat Flight Simulator, Flight Simulator 98 and Flight Simulator 2000. Alpha Simulations are a team of twelve flight simulation enthusiasts, many of who are already well known for their aircraft designs and other projects, formerly offered as freeware or shareware.

The list of aircraft in the package reads like a directory of aviation in general and more particularly, British aviation. It provides some of the finest and what many people consider the most beautiful aircraft ever to grace a runway. Included for the first time are the famous 'V' bombers, starting with probably the most notable jet bomber of all time, the Avro Vulcan B.Mk.1. Then the Vickers Valiant B.Mk.1 and the Handley Page Victor B.Mk.1. It's rather sad to think that none of these wonderful aircraft are flying today.

YOU'LL NEED ONE BIG HANGAR FOR THIS LOT

- Avro Shackleton MR.3
- Avro Vulcan B.Mk.1
- Boeing B-47E Stratojet
- Boeing B-52F Stratofortress
- Convair F-102A Delta Dagger
- Dassault Mirage IVA
- De Havilland Vampire T.11
- De Havilland Venom
- English Electric Canberra B.Mk2
- Gloster Javelin FAW.5
- Gloster Meteor F.Mk.8
- Handley Page Victor B.Mk.1
- Hawker Hunter F.6
- Hawker Hunter T.7
- Ilyushin I1.28 'Beagle'
- Lockheed F-104S Starfighter
- Lockheed P-3A Orion
- McDonnell F-101B Voodoo
- Mikoyan Gurevich Mig-15 'Fagot'
- Mikoyan Gurevich Mig-19 'Farmer'
- North American B-45C Tornado
- North American F-86K Sabre
- North American F-100D Super Sabre
- Sukhoi SU-I1 'Fishpot'
- Tupolev Tu-16 'Badger'
- Tupolev Tu-142 'Bear'
- Vickers Valiant B.Mk.1
- Yakovlev Yak-28P 'Firebar'

ALSO CONSIDER

Software Title:	Lufftwaffe Collection
Publisher:	The Associates
Website:	www.flisghtsim.co.uk
Price:	£24.99
PC Pilot Rating:	

Scratch one Bf109...

The Boeing Stratofortress is one of the largest aircraft from this era, with a wingspan of over 56 metres.

The designers have captured the graceful lines of the Hawker Hunter, as this high level shot shows

A close-up of the Sukhoi SU-I1 'Fishpot' highlights its unusual air intake design.

The package also includes some of the early fighters and bombers from the Warsaw pact countries, many of which, like the Sukhoi SU-I1 'Fishpot', Tupolev Tu-16 'Badger and the Tupolev Tu-142 'Bear', have never appeared in any other aircraft collection. Other legendary aircraft include the English Electric Canberra B.Mk.2, Gloster Meteor and Javelin, the sleek Hawker Hunter F.6 and T.7. There is also the famous Lockheed F-104 Starfighter, nicknamed the 'Widow Maker' due to the number of pilots that met their deaths while trying to control this rather unstable aircraft. From the Korean War are those celebrated adversaries, the Mikoyan Gurevich MiG-15 and the North American F-86 Sabre. The list is certainly long and distinguished but unfortunately that's all you get because there's no new scenery, fresh assignments or campaigns.

On the plus side the 28 different aircraft are beautifully designed and come complete with their own individual flight dynamics and control panels. These contain detailed and fully working gauges that are based on the actual cockpits of the real aircraft, not simply adaptations of a generic panel. Moving to the exterior, you have accurate airframes designed by the Alpha team using original drawings and in some cases referencing the actual aircraft found in the Midland Air Museum (who also get a mention in the manual). They all have fully animated under carriage and realistic movement throughout the major control surfaces. Incidentally, they have also been optimised to display typical armament load-outs and damage profiles when used in Combat Flight Simulator. If you take up an external view you can see that the authors have certainly done their homework to make these aircraft authentic in their body contours, paint schemes and squadron markings.

The attention to detail is even more apparent once you are airborne, where the flight dynamics give each aircraft an individual feel. The fighters are swift and highly manoeuvrable, while the bombers are lumbering and relatively slow to react, which is exactly what you would expect. We rather think that any assessment of accuracy of flight models is somewhat speculative unless you've flown the real aircraft. In any event, trying to land the Boeing B-52F Stratofortress on a grass field is not something to be undertaken lightly!

Finally, the package includes a 57-page colour illustrated manual containing pictures of each aircraft with its panel, a potted history and full specifications, including dimensions and speed data. This information is essential if you want to use the aircraft within Microsoft's Flight Simulator 2000 because the flight planner needs to know take-off and cruise speeds, as well as the V1, V2, stall speeds and fuel consumption in order to create proper flight plans.

The lack of any new missions to fly is somewhat disappointing; although you can substitute the aircraft in any existing missions you have, to give them a different slant. The quite significant difference in speed between the North American F-100D Super Sabre and the Messerschmitt Bf109E, is shall we say… interesting. ■

Joe Lavery

REVIEW SCORE:

Publisher:	Alpha Simulations	**Price:**	£24.99
Website:	www.alphasim.co.uk	**Release Date:**	Out Now
Developer:	Various		

Pros: Provides users of Microsoft's Combat Simulator and Flight Simulator with a huge range of aircraft, many not available before.

Cons: No scenery or missions provided to accompany the aircraft.

System Requirements: Pentium II 200, 32Mb RAM
Recommended: PIII 550, 128Mb RAM, 16Mb 3D graphics card

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Fly is the most realistic general aviation flight simulation ever created. Everything from mountain peaks to sea level is accurately represented. Aircraft include fully operational: Piper Malibu Mirage, Beechcraft King Air 200, Cessna 172 Skyhawk, Piper Navajo Chieftain and the Cessna Citation X all in meticulously detailed cockpits and avionics. There's nowhere in this world you can't go!

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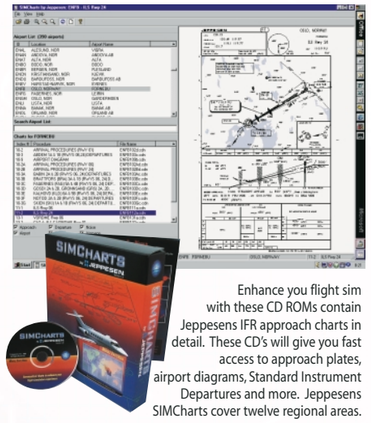
Jeppesen SIMCharts



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4392D **Great Britain & Ireland** **£24.99**

Fly Direct

Fly Direct was conceived as a navigation and information tool for flight sim users, to enhance the Microsoft Flight Simulator. Specifically, this programme features the unique "Course Finder 98' engine that enables first time users as well as power and design users, to locate every airport on their disks, to log and list every nav-aid and then to enable users to plan a direct, point-to-point flight. The Fly Direct interface allows you to update databases of VOR's and NDB's, and to manually programme new data as and when you like.

4423D **Fly Direct** **£29.99**

Twin

Go fly the most realistic Twin Props dedicated flight simulator programme ever devised, and learn how reality based aircraft and cockpit simulation can help your understanding of the Piper Seneca V and the Beech C90c. These two great general aviation aircraft are rendered in visual detail, with realistic digital sound, flight handling, a host of new gauging/switching appropriate to twin operation, with moving surfaces such as elevators, flaps, gear, and rudder controls. As a practical training aid, Twin may just help your real life studies for a Multi-Engine rating!

6921D **Twin** **£29.99**

Flight Sim 2000

FS 2000 includes new building textures, new advanced 3D building models, and a true elevation model of terrain. It also features an integrated flight planner with real Jeppesen navaid data, an updated weather system with advanced weather dialogue and the addition of new cloud textures and weather effects. Microsoft have updated the existing aircraft library by creating new textures for all its planes, both inside and out, also Concorde and Boeing 777 are added to the library.

4430B **MS Flight Sim 2000** **£42.50**

2001B **MS Flight Sim 2000 Pro** **£69.99**

Combat Flight Simulator

The most realistic combat simulation ever to take flight. Microsoft have incorporated accurate flight characteristics for each aircraft, with aircraft including: The Hawker Hurricane, Spitfire, FW 190, BF 109, P47D Thunderbolt and the P51D Mustang. Fly through realistic war-torn landscapes of London, Paris and Berlin. Fly against computer controlled aircraft such as: JU87 Stuka, Heinkel 111, Junkers JU88 and Boeing B-17G, or wage war against human opponents via modem and the internet.

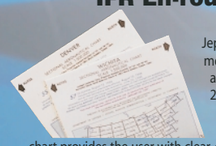
4566D **Combat Flight Sim** **£39.99**

ProFlight 2000

Proflight 2000 is an instrument procedural flight simulator for Windows '95 and '98. It is an essential personal training aid for pilots training for or maintaining the Instrument Rating or UK IMC Rating, and for PPL's who wish to gain a general understanding of radio navigation as an aid to VFR flight. The software includes photo-realistic Piper and Cessna instrument panels.

8580D **ProFlight 2000** **£125.00**

IFR En-route Charts



Jeppesen En-route charts are used by most airlines for IFR flying. These low altitude charts cover airspace below 24,500 feet and accurately show the geographical borders and airspace boundaries of each country. Each chart provides the user with clear, concise flight information, showing VOR's, NDB's, ILS's, Air Traffic Control frequencies, danger areas as well as airports large and small. Use the same charts as real airline captains to make your flight a real experience!

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THE NORTH WIND DOTH BLOW

COMPENSATING FOR WINDS

Flying in winds adds realistic challenges to any simulated flight, because real-world pilots fly in winds more often than in calm air. Flying in winds requires continual adjustments from taking off through flying en-route to landing. It also means you need to know the wind's direction and speed at all altitudes for your flight. For this reason, consulting your weather briefing is necessary before embarking on your flight.

Because the same principles and methods of flying in winds apply to VFR and IFR flights, we will explain them once here rather than twice in both tutorials.

Taking Off in Winds

Taking off in a headwind, which comes from ahead of our aircraft, requires less runway length than in calm air, because the wind provides some of the air movement over the wings to generate lift for the aircraft. You will still need the same airspeed for taking off, but you will attain it in less runway distance.

In a crosswind, which comes from one side of the aircraft, the aircraft taking-off quickly drifts to one side of the runway centreline. To maintain course, the pilot needs to head into the wind enough to stay on the runway centreline until

BEFORE YOU START

OUR FLIGHTS AND AIRPORTS

In this pair of tutorials, we will fly from Birmingham International Airport, where we left off last time, to Dublin.

Birmingham International Airport is a busy commercial airport about 80 miles northwest of London. It was opened in 1939, serving as a military airbase during World War II and operating as a civil airport since 1946. About 20 scheduled airlines, 20 charter airlines and numerous general-aviation aircraft use this busy airport. Our flights will take us across beautiful English countryside, which we will see during our VFR flight. Learn about Birmingham International Airport at www.bhx.co.uk

Dublin, the capital of Ireland, is a wonderful Irish city of approximately one million people on the east coast of this beautiful republic. Its harbour, rivers, peninsulas and breakwaters make it scenic for real-world pilots and flight simmers, too.

Dublin Airport (EIDW) is another busy international airport. Officials call it "one of the fastest growing airports in the world." AerLingus and Ryanair are based there. British Airways, Delta, Lufthansa and numerous other carriers also use it. It has two east/west runways and one northeast/southwest runway. The longest runway is 8,652 feet, and the shortest is 4,450 feet. Read about Dublin International Airport at www.dublinairport.com

The actual flight distance between these cities will be about 170 nautical miles, and our flight will last about 90 minutes from take-off to landing.

OUR AIRCRAFT

Some simmers would like us to use jetliners in our tutorials. Frankly, we think that's a bit ambitious for simmers that are still learning the charts and procedures. We'll show you how to fly it in a general-aviation aircraft, and then you can try it in larger, more sophisticated aircraft if you wish. So for your first flight of this tutorial, use a small general-aviation aircraft such as a Cessna 172/182, a Beechcraft Bonanza or a Mooney Bravo.

OUR FLIGHT PLANS

We will use flight plans for both our VFR and IFR flights. Each tutorial explains what should be in each flight plan. In the real world, pilots would file their flight plan with ATC. In lieu of ATC, we will imagine that we have filed in accordance with regulations. We will keep our flight plan handy throughout the flight so we can easily refer to it. After our flight, we can file it in a folder or loose-leaf notebook, or we can discard it.

THE WEATHER

For both flights, we'll use typical visibility and a mild wind from the northwest. Set your visibility at ten miles, wind at five knots and direction at 300. This seems to be typical British weather at the moment. Read the section about flying in winds before embarking on these flights.

For the VFR flight, we must not have any clouds in our flight path, or we cannot fly VFR. If you use clouds for your VFR flight, be sure they are at least 500 feet above our cruising altitude. For our IFR flight, we'll use an overcast that blocks all views of the ground for most of the flight. Set it at no lower than 1,000 feet MSL and as high as you like.

KNOW HOW YOUR SIM OPERATES

How you operate your flight-sim program is up to you. Some flight simmers use common joysticks. Others use advanced flight-sim joysticks. Some of us rely entirely on the keyboard. A few flight simmers actually use yokes and rudder pedals. We assume that you know how to operate your flight sim and you are familiar with your controls. If you are not familiar with your sim's operations and controls, familiarize yourself now and return to this flight lesson when you are ready.

FLY ONE STEP AT A TIME

We hear from many flight simmers that want to leap over the basics and challenge themselves with heavy aircraft and instrument flight right off. While this is a great luxury of flight simulation, it deprives simmers of the skills they need for meeting their advanced challenges. When trying to meet challenges for which they are unprepared, flight simmers frustrate themselves with poor performance such as sloppy landings and even crashes. So we strongly advise doing everything one step at a time and building your skills toward the next levels.

USE THESE TUTORIALS FOR FLIGHT SIMMING, ONLY

These tutorials are intended for computer flight simulation, not for real-world aviation or flight training. While making our tutorials as realistic as feasible, we have adapted them out of necessity to the limits and nuances of flight simulation, so some aspects cannot and do not apply to real-world flight. Therefore, we caution everyone to use these tutorials for their intended purposes, and we accept no liability for anybody's misuse of them.

REFER TO OUR PRIOR TUTORIALS

For space considerations, we will not repeat common aspects in every tutorial. If you do not have our previous tutorials, back issues are available direct from us over the telephone or through our website at www.pcpilot.net

OUR AUTHORS

Bill Stack is an expert flight simmer and author of several popular flight-sim books. Nels Anderson, technical consultant, is a certified pilot, renowned flight simmer and President of www.flightsim.com

turning at the first en-route fix. The exact amount of adjustment differs with wind speed, wind direction, and airspeed. Practice turning your aircraft slightly toward the wind.

Pilots should avoid taking off in tailwinds, which come from behind the aircraft, because they add to the required runway length and reduce your control over the aircraft.

Holding Course En-route

Holding your course during the en-route portion of your flight requires similar adjustments. We can guess at how much adjustment is needed and use trial and error until we find the adjustment that works best. Or we can use a more precise method — the wind triangle.

The wind triangle is a proven method of determining heading adjustments to compensate for wind effects while en-route to a destination. It differs slightly for head winds and tail winds, yet the principle is always the same. It also applies to VFR and IFR flight, so although we are using our VFR tutorial for examples, our IFR pilots can use the same principle with appropriate adaptations for the IFR tutorial.

For a head wind:

1. Draw two dots on a sheet of paper. Make them horizontal to each other and as far apart in millimeters as your airspeed in knots (120, 130, etc.). This will represent the distance you would travel in one hour (exactly how far you travel isn't relevant). Label the start dot 'O' and the other dot 'D' for destination. Draw a straight line between your origin and destination dots. This is your true course – the one you want to fly. Draw a vertical line through your O dot. This simulated meridian is for reference, only. You will use it for protractor readings.
2. Draw through the O dot a line representing the wind direction and speed. Make it the wind's direction relative to your course. In our VFR tutorial, our course between Birmingham and Shawbury is 305, and the wind is 300, so make the wind line five degrees from the true course line and coming from the left. Make this line as long in millimeters as the wind's speed (ten millimeters for ten knots). Label the end of this line HW for headwind.
3. Draw a line from the end of your wind line to the destination point, and label it H for heading.
4. Measure with a protractor the angle between the true course (TC) line and the heading (H) line. Label this angle WC for wind correction. This angle is the number of degrees you will need to head off course toward the wind to compensate for it. So when flying from Birmingham to Shawbury in a ten-knot wind from 300, you will head 303 instead of 305, then you will arrive, as if by magic, at Shawbury as desired instead of a few miles east of that point.
5. Notice that your heading line is longer than your true course line. This is because the headwind holding you back increases the time needed to reach your destination.
6. Whenever the course changes from one leg to another, a different wind triangle must be drawn for each leg.

For a tailwind, draw similar points, lines, headings, and distances for the tailwind conditions. You will see that the heading line is shorter than the true course line, because the tail wind's push can increase your airspeed and shorten the time needed to reach your destination.

Refer to our wind-triangle diagram to help you see, approximately, how they should look.

Landing In Winds

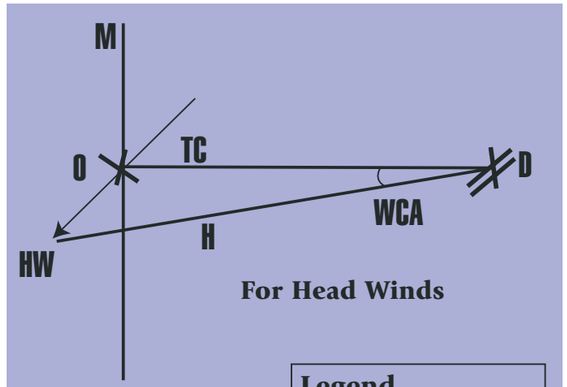
Landing in winds is tricky and requires practice. The same method works for VFR and IFR landings (remember that all landings are visual). For these tutorials, the wind will be more a headwind than a crosswind, but the crosswind element will be there.

Crabbing. The easiest method for landing in a crosswind is to 'crab' your aircraft. Crabbing means pointing your aircraft towards the wind enough that your actual track is along the runway centreline. The notion is similar to a crab walking in a different direction from its heading. It is the same principle used for wind compensation during your en-route flight. Crabbing during a landing approach requires frequent adjustment as the difference between the wind speed and airspeed varies during the approach.

Slipping. Another crosswind landing method is to slip along the runway centreline. Slipping requires turning toward the wind with the ailerons then yawing back toward the runway with the rudder. The aircraft seems to be flying straight ahead, but it is actually flying slightly towards the wind. The wind then pushes it back so that it tracks along the runway centreline. Without the wind, the crabbing or slipping aircraft would fly slightly away from the runway centreline.

Remember that landing in winds requires practice; so don't feel bad if your first attempt is a bit sloppy. If you can't get the aircraft aligned properly for landing, you will have to execute a go around (VFR) or missed approach (IFR) and try again.

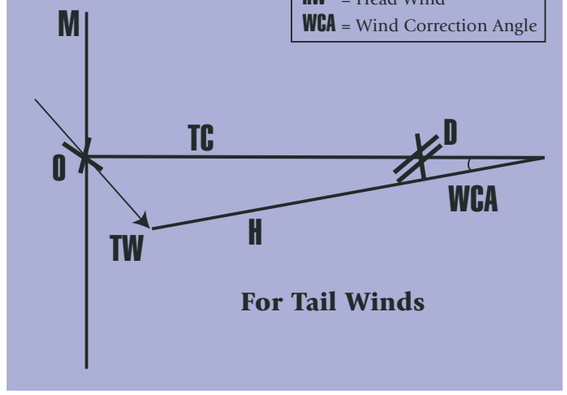
Learn more about wind compensation in Bill Stack's Flight-Sim Navigation at www.topskills.com/flitsim.htm ■



For Head Winds

Legend

D	= Destination
H	= Heading
M	= Meridian
O	= Origin
TC	= True Course
TW	= Tail Wind
HW	= Head Wind
WCA	= Wind Correction Angle



For Tail Winds

The Wind Triangle, use this method to get yourself where you want to be

PC Pilot's tutorials are officially approved by TopSkills

Bill Stack is an expert flight simmer, the author of numerous training manuals for flight simulation computer programs and the owner of TopSkills in the USA. TopSkills publishes and distributes reference and self-learning books about flight simulation and other subjects.

The books that cover various flight sim subjects are:

Flight-Sim Pilot's Information Manual 1999,
Instrument Flying for Flight-Simulation Pilots
Flight Sim Navigation
Flight Sim Maneuvers
and others....

All these great books can be obtained by visiting The TopSkills website at www.topskills.com

Nels Anderson, technical advisor for these tutorials, is a general aviation pilot and president of www.flightsim.com

VFR (Visual Flight Rules) Tutorial

Part 4

Across the Welsh countryside and over the Irish Sea

After flying to Birmingham from London, we're now ready for a longer flight over land and water. The objective of this tutorial is to fly cross-country from one airport to another using radio navigation aids for guidance and positioning. Our flight will cross English countryside as well as the Irish Sea between England and Ireland. We will use NDBs, which comprise an old but still useful radio navigation system, and VORs, which are a more modern method. The entire flight will take about 90 minutes, with about 25 minutes being over open water. If you have GPS, do not use it for this tutorial so you can learn how to use radio navaids.

PREPARE AND BEGIN YOUR FLIGHT

Prepare your flight exactly as we did in our previous tutorials. Additionally, set your NAV1 radio to 116.80 for Shawbury VOR (SWB) and set your OBI gauge on 305, this is approximately our first en-route heading after taking off. If your sim lacks Shawbury VOR (Flight Simulator in particular), then use Sleap NDB (382), which is nearby.

Take off and climb out as explained in our first two tutorials. Be sure to raise your landing gear after taking off if you're using a retractable-gear aircraft.

EMBARK ON YOUR EN-ROUTE FLIGHT

Once you reach 1,400 ft MSL, which is about 1,000 ft AGL at Birmingham, make two course changes. (1) Change your climb rate to 500 feet per minute if it has been more than that. This vertical climb rate is comfortable for occupants, and it enables a productive airspeed during the climb. (2) Turn right at a steady 20-degree bank and head 305 degrees toward Shawbury VOR. When you straighten out after this turn, your OBI's needle should be aligned with the 309 radial or close to it. Adjust your heading as necessary to head straight for Shawbury. After these changes, continue climbing to our cruising altitude of 6,500 ft MSL.

Shawbury is about 37 miles from Birmingham; so a little altitude will be needed to receive it. This leg of our journey should take 20 to 25 minutes, depending on airspeed and wind.

Once you reach 6,500 ft MSL (about 11 minutes after taking off), maintain that altitude with elevator trim or autopilot. You can also reduce your throttle slightly, as not as much power will be needed for cruising as for climbing.

Notice as you head toward Shawbury that your course relative to this VOR changes slightly. This change results from the westerly wind we set in our weather. There are several ways of compensating for this change. The simplest is to continually adjust your course, but that is a bit of a hassle. A better method is to alter your heading enough to overcome the wind's effects. Simply stated, we will head a bit west of our target VOR, and the wind will push us back onto our desired course. The best way to determine this compensatory heading is to use the wind triangle (see section on this earlier).

Once you reach Shawbury, turn left at 13 degrees at a 10-degree bank, and head 297 toward Valley TACAN (VYL), including your heading adjustment for the wind. A TACAN is similar to a VOR, but it is displayed differently on the charts. The official US Aeronautical Information Manual states: "Although the technical principles of operation of TACAN equipment are quite different from those of VOR/DME facilities, the result as far as the navigating pilot is concerned is the same." Notice on the chart that Valley TACAN lacks the compass rose used for VORs. Valley TACAN is approximately 70 nautical miles from Shawbury, so we will track from Shawbury for a while on its 297 radial. This leg of our journey will take about 33 minutes.

After about 17 minutes, we should be about halfway between Shawbury and Valley, or about 35 miles from each navaid according to the respective DMEs. This means that if we are still receiving Shawbury, we should be able to receive Valley. So switch your NAV1 radio to 108.40 and attempt to receive Valley TACAN. When you receive Valley, adjust your course as necessary to head toward it, including your wind compensation.

On the second half of this leg, we will fly over the Snowdonian mountains of northern Wales. In a few minutes, the coastline and Irish Sea should become visible in the distance. Soon, we will reach Valley TACAN, which is on the island of Anglesey.

When you reach Valley, turn left eight degrees at a 10-degree bank and head 289 toward Dublin VOR (DUB). As with Shawbury, we will track from Valley on its 289 radial for a while. Remember to adjust your heading to compensate for the wind on this course. This leg will take approximately 25 to 30 minutes.

In two or three minutes, you will fly past the last point of land in England and head over the open water of the Irish Sea toward Ireland. You should see Hollyhead Island to the right of your aircraft. For the next 20 minutes or so, you will see nothing outside your aircraft but water, sky and perhaps a distant coastline. There will be no landmarks for any visual guidance. This means that you will depend on your knowledge of radio navigation to get you to Ireland. Of course, you have already depended on radio navigation to get you this far, so it should not be a problem for you. Be sure to adjust your heading as necessary to stay on Valley's 289 radial until you can receive and track Dublin VOR.

About 15 minutes after passing Valley, we should be about halfway between Valley TACAN and Dublin VOR. Switch your NAV1 radio to 114.90 for Dublin. When you receive it, adjust your heading as necessary to track toward it along its 109 radial.

BEGIN APPROACHING DUBLIN AIRPORT

When you are 20 miles from Dublin VOR per its DME, begin descending at about 750 feet per minute toward an airport traffic pattern altitude of 1,300 ft MSL. Dublin airport's elevation is 242 ft so 1,300 ft MSL will place us roughly 1,000 feet above the airport. At this descent rate, we should be at our 1,300 ft MSL altitude in about seven minutes.

Notice on the chart that Dublin VOR is about five miles northwest of Dublin airport. Instead of wasting time flying to Dublin VOR then heading south to the airport, we'll change course and head straight for the airport. When you are 15 miles from Dublin VOR, according to its DME, turn left 14 degrees and head 275 toward the airport.

This final leg of our en-route flight will last about eight to ten minutes, depending on airspeed and wind. When you start heading 275, you should see a peninsula just left of centre. In a few minutes, you should see Dublin airport straight ahead.

READJUST YOUR AIRCRAFT

Adjust the aircraft for the changing air density and new flight phase: (1) Fuel mixture rich, (2) propeller RPM high, (3) landing lights on, (4) carburettor heat on and (5) altimeter consistent with local weather report.

CONTACT DUBLIN TOWER

As soon as you begin descending, contact Dublin tower at 118.60 and announce your intentions to land there, or simulate this contact yourself. ATC manages this busy commercial airport strictly. In lieu of ATC vectoring and clearance in our simulators, we will adhere to a standard airport traffic pattern.

Dublin airport has two east/west runways (10/28 and 11/29) and one northwest/southeast runway (16/34). Given that our winds are westerly, either of Dublin's west-headed runways is alright for landing. Normally, ATC would tell us which runway was active, but in lieu of ATC, you (the pilot) can choose which of them you want to land on. Pilots would tell ATC of their intention to land on that runway and receive clearance for the procedure.

JOIN THE AIRPORT TRAFFIC PATTERN

Enter the traffic pattern for whichever runway you decided to land on, as explained in our previous tutorials. Don't head straight in for a landing, even though it would be more convenient and ATC might clear you for a straight-in landing. We want you to practice your traffic patterns in winds. You will find that our 10-knot wind will alter your course on this pattern, so adjust your heading as necessary to stay in the pattern.

LAND AT DUBLIN

Refer to the 'The North Wind Doth Blow' box for the most common methods of landing in winds. For these tutorials, the winds will be more headwinds than crosswinds, but there will nonetheless be a slight crosswind element.

CONGRATULATIONS!

You have just navigated about 175 miles by using radio navigation aids. For more of a challenge, fly this route again with stronger winds and/or a more sophisticated aircraft. For more information about visual navigation, read Bill Stack's Flight-Sim Navigation at www.topskills.com/flitsim.htm ■

Bill Stack

Pilot: PC Pilot

Flight-Sim Flight Plan

Date:

Flight Rules (circle one)	Aircraft Type	True Airspeed	Departure Time	Cruising Altitude	Arrival Time
VFR IFR	Single engine	140 kts		6,500 MSL	

Flight Route

Landmarks	Navaids & Frequencies	Headings	Distances	Durations
	Shawbury VOR (SWB) 116.8	308	37 nm from EGBB	16 mins
Birmingham outskirts Telford	Valley TACAN (VYL) 108.4	297	72 nm from SWB	33 mins
Berwin Mountains Anglesey Island	Dublin VOR (DUB) 114.9	289	63 nm from VYL	28 mins
Hollyhead Island	Dublin Airport	275		10 mins
			172 nm	87 mins

Origin Airport	Destination Airport	Alternate Airport (IFR only)	Estimated Duration
Name: Birmingham EGBB	Name: Dublin EIDW	Name:	90 mins
Elevation: 325	Elevation: 242	Elevation:	Fuel Needs
ATIS: 126.27	ATIS: 124.52	ATIS:	40 gallons
Tower or Departure: 118.3	Tower or Arrival: 121.1	Tower or Arrival:	

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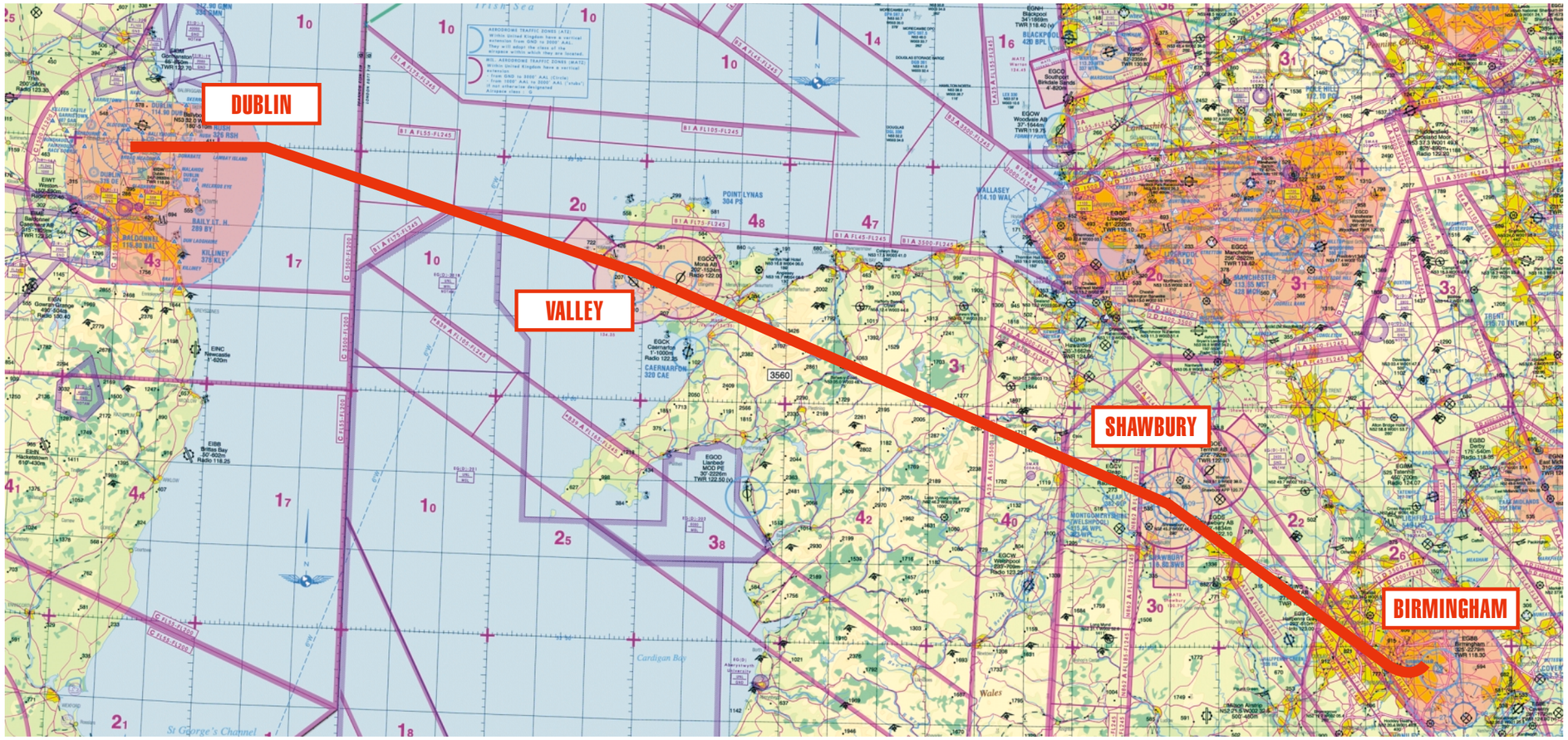

Arriving at Dublin (in Flight Simulator 98)

IFR (Instrument Flight Rules) Tutorial

Part 4

Instrument Flight with a VOR/DME Instrument Approach

Before starting this tutorial please make sure you read the 'Before You Start' and 'The North Wind Doth Blow' sections that appear at the start of the VFR tutorial on preceding pages.

Challenge yourself with a 175-mile, 1½ hour instrument flight to Ireland with a non-precision instrument approach. The objective of this IFR tutorial is to fly en-route using radio navigation aids and approach the airport using a non-precision approach procedure. This type of approach lacks the precise altitude guidance provided by a localizer and glide slope. We will approach Dublin using a VOR procedure and land on runway 34. You, the pilot, will be unable to see anything outside your aircraft from just after taking off to just before landing. The duration of this flight will test your stamina, too.

Our flight plan reflects our flight path. Normally, pilots would make their flight plans in duplicate, submit a copy to ATC (air traffic control) and use their original in the cockpit. In lieu of ATC, we will make one flight plan, use it during our flight and file it after our flight in a folder or loose-leaf binder.

SELECT THE RUNWAY

With our winds being from the northwest (300), the active runway at Birmingham would be 33, because it faces 330. Similarly, the active runway for landing at Dublin will be 34.

READ YOUR CHARTS

The charts show our route from Birmingham to Dublin as well as instrument procedures for using each airport.

Departure. The SID (Standard Instrument Departure) chart for northerly departures from Birmingham 33 calls for aircraft to fly north/northwest to an NDB named Whitegate at 6,000 ft MSL.

En-route. The en-route chart shows the airways and navigation aids we will use from just after leaving Birmingham to just before arriving at Dublin.

Arrival. The IAP (Instrument Approach Procedure) chart shows the procedures we will use between our en-route portion and our landing at Dublin.

Familiarize yourself with all relevant aspects of these charts before taking off so you won't have to fumble around in the aircraft trying to figure them out. Note that some of the instrument procedure charts are not to scale, so the courses depicted on them are not precisely drawn. On these charts, follow the textual directions and use the graphical depictions for comprehension only.

Pilot: *PC Pilot* — **Flight-Sim Flight Plan** — Date:

Flight Rules (circle one)	Aircraft Type	True Airspeed	Departure Time	Cruising Altitude	Arrival Time
VFR IFR	*Single engine*	*140 kts*		*8,000 MSL*	

Flight Route

Landmarks	Navaids & Frequencies	Headings	Distances	Durations
	Birmingham SID (WHI 3D)			
	Birmingham ILS/DME (IBIR) 110.1	*329*		
	Whitegate NDB (WHI) 368.5	*329*	*54 nautical miles*	*24 minutes*
	Wallasey VOR (WAL) 114.1	*300*	*24 nm*	*12 mins*
	Dublin VOR (DUB) 114.9	*279*	*111 nm*	*48 mins*
	Dublin VOR/DME 34 approach	*344*	*16 nm*	*8 mins*
	Dublin Airport			
			205 nm	*92 mins*

Origin Airport	Destination Airport	Alternate Airport (IFR only)	Estimated Duration
Name: *Birmingham EGBB*	Name: *Dublin EIDW*	Name: *Gormanston (EIGM*	*100 mins*
Elevation: *325*	Elevation: *242*	Elevation: *65*	Fuel Needs
ATIS: *126.27*	ATIS: *124.52*	ATIS:	*60 gallons*
Tower or Departure: *118.3*	Tower or Arrival: *121.1*	Tower or Arrival: *122.7*	

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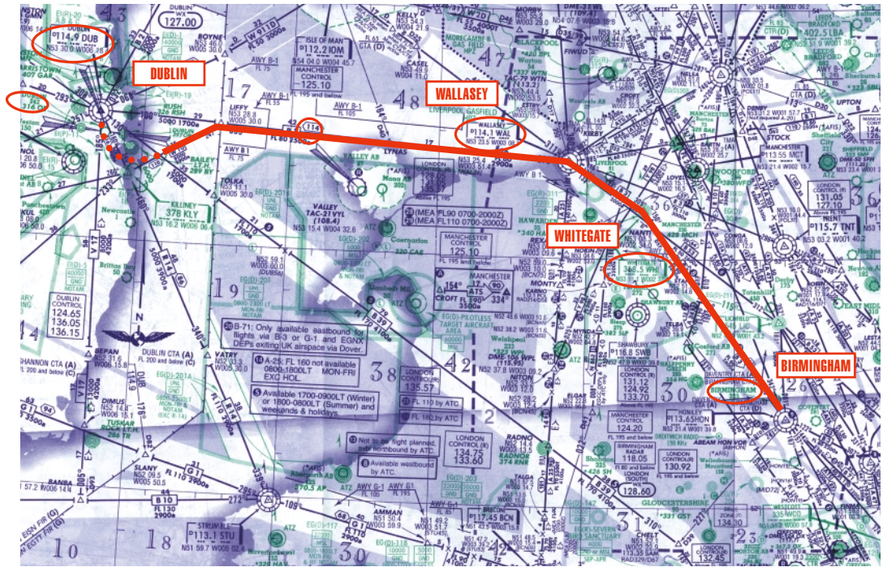
SET YOUR RADIOS AND GAUGES

Set your radios and gauges for the frequencies you will need, as shown on the charts: Whitegate NDB (WHI) 368.5 (you might need to adjust the default setting in your sim to allow NDB decimals) and Honiley VOR 113.65. If your radios enable the setting of standby frequencies, enter Birmingham's ILS frequency (110.1). Otherwise, be prepared to enter new frequencies when necessary.

With Whitegate NDB being about 50 miles away, you will need to gain altitude and get closer to the station to receive its signal. Turn on the audio for your ADF so you can hear its Morse code signal it when the navigation beacon is received.

Be sure your altimeter is properly set for local barometric pressure. Precisely following this SID requires us to be where we should be when we should be there. Even a slight altimeter error can make us believe we are enough above or below our actual altitude to create real problems for other aircraft using the airspace - aircraft we cannot see and who cannot see us because of the low-visibility weather conditions that mandate our instrument flight.



This is the route we shall take on our flight from Birmingham to Dublin

TAKE OFF NORMALLY

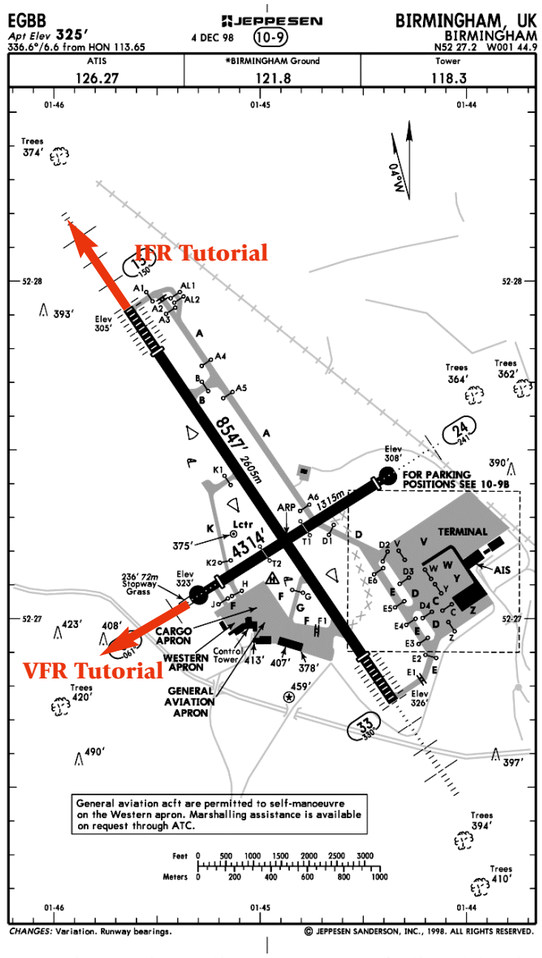
Take off as normal, including cockpit preparation and appropriate ATC clearances, as explained in our previous tutorials and taking careful not of our advice on winds (see the 'The North Wind Doth Blow' section earlier). For space considerations, we will not repeat aspects in each tutorial.

DEPART BIRMINGHAM

Notice on the SID that the procedure is a bit of a hassle. We head straight out until we intercept the 329 radial from Honiley VOR (113.65) and follow it to the next fix. But we determine our positions using the DME from Birmingham's ILS/DME (110.1). If your aircraft allows standby frequencies, program both Honiley and the ILS, and switch back and forth as necessary. Otherwise, be prepared to manually change the frequencies.

After taking off, climb at 500 feet per minute and continue heading 330 for a few miles until you intercept Honiley's 329 radial. Then head 329 outbound along that radial toward Whitegate NDB. Be sure to adjust your heading as explained in the section on winds.

The SID shows that by the time you reach certain points on your path to Whitegate, you should be at certain altitudes. (1) When you are 17 miles from Birmingham, you should be at least 5,000 ft MSL. (2) When you are



Airport diagram showing the runways we use for these tutorials

20 miles from Birmingham, you should be at least 6,000 ft MSL. The SID also states that we should not climb above 6,000 ft MSL without ATC clearance. If you climb at 500 feet per minute, which is common in light general-aviation aircraft, you shouldn't have any trouble meeting these requirements.

ADJUST YOUR AIRCRAFT

Adjust your propeller pitch and fuel mixture for your cruising altitude. They will give you optimum performance and fuel efficiency, as well as offer some kindness to your engine! You will maintain these settings until you begin your descent to Dublin.

With your flight through clouds in cool weather, icing is a risk. Your aircraft probably has no de-icing equipment, but it likely has a heater for your Pitot tube and a heater for your carburettor. You might turn on your Pitot heat as a precaution, but don't turn on your carburettor heat unless you need it. Although carburettor heat is necessary for melting ice in the chamber, it otherwise diminishes performance.

PLOT YOUR POSITION

During your flight from Birmingham to Whitegate NDB, plot your position frequently and adjust your heading as necessary to stay on course. Tracking your progress en-route is especially important whenever confronted with winds from any direction. Headwinds will slow your progress while tailwinds will improve your progress. Crosswinds will blow you off course. Most winds involve elements of both head winds and crosswinds or tailwinds and crosswinds - thus combined effects will result. Do not allow yourself to drift too far off course, or you will slide out of the departure procedure.

JOIN THE AIRWAY

When we reach Whitegate, we will exit the departure procedure and enter the en-route airway. We should arrive here approximately 23 minutes after taking off from Birmingham, depending on airspeed and winds. Once you reach Whitegate, notify ATC at Birmingham. They will hand you to Manchester Control. If your simulation lacks this ATC level, simulate the switchover yourself.

Airway B3 goes from Whitegate to a VOR named Wallasey (114.10). Wallasey is a few miles west of Liverpool. Our heading for this leg is 309, as shown on the chart, so turn left 20 degrees at a gentle 10-degree bank and head 309 (with appropriate wind compensation, of course).

Switch your OBI from Birmingham ILS to Wallasey VOR (114.1), and fly straight to Wallasey.

Maintain your cruising altitude of 6,000 ft MSL. Remember that aircraft flying westbound under IFR, cruise at even altitudes.

TRACK YOUR PROGRESS EN-ROUTE

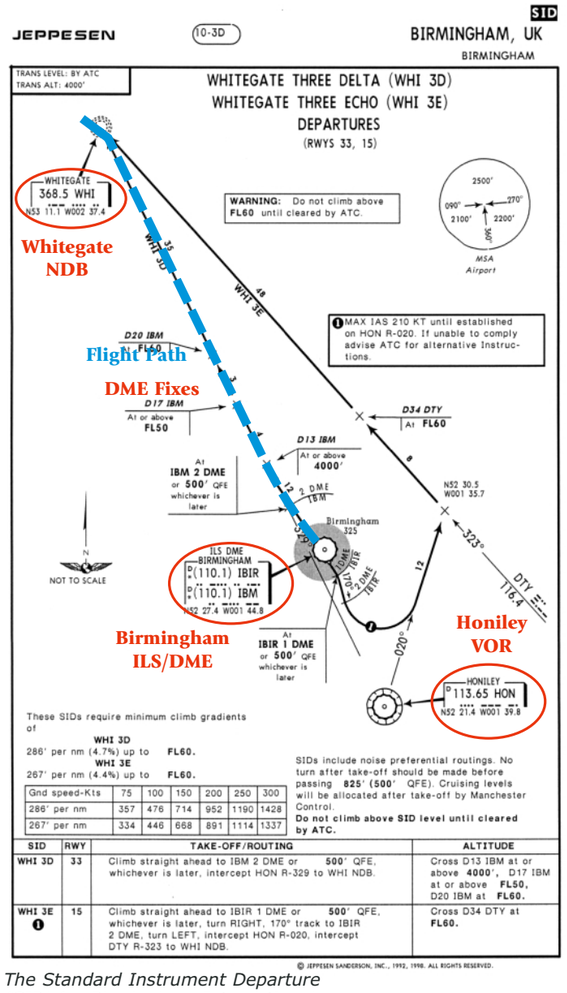
This leg of our flight is about 23 miles and will last about ten minutes. Plot your position frequently and adjust your heading as necessary to maintain a course toward Wallasey along its 309 radial.

Use Wallasey's DME to determine your approximate position. If you are aligned with its 309 radial and heading straight for it, the DME will provide reasonably accurate positioning data. For example, if you are properly aligned and the DME says you are nine miles away, you are just about over Liverpool harbour (whether or not you can see it).

Once you reach Wallasey VOR, turn left at a gentle 10-degree bank and head 279 toward Dublin VOR (with appropriate compensation for winds). This leg of our journey will be 114 nautical miles and will last about 50 minutes, depending on airspeed and winds. The small polygon along the airway with 114 inside shows the distance between the navaids.

Track your position from Wallasey VOR for the first half of this leg, then toward Dublin for the second half. After you are 55 miles or about 25 minutes from Wallasey, switch to Dublin VOR (114.90). Dublin's DME should show you to be about 55 miles away. Adjust your heading as necessary to head toward Dublin VOR on its 279 radial.

Notice on the chart that Dublin VOR is about five nautical miles north of Dublin Airport. We won't bother flying to Dublin VOR for our southerly approach. Instead, we will


JEPPESEN
(10-3D)
SID
BIRMINGHAM, UK
BIRMINGHAM
TRANS LEVEL: BY ATC
TRANS ALT: 4000'
WHITEGATE THREE DELTA (WHI 3D)
WHITEGATE THREE ECHO (WHI 3E)
DEPARTURES
(RWYS 33, 15)
WHITEGATE 368.5 WHI
N53 11.1 W002 37.4
Whitegate NDB
WARNING: Do not climb above FL60 until cleared by ATC.
MAX IAS 210 KT until established on HON R-020. If unable to comply advise ATC for alternative Instructions.
MSA
Airport
D20 IBM At FL60
Flight Path
DME Fixes
D17 IBM At or above FL50
D13 IBM At or above 4000'
D34 DTY At FL60
At IBM 2 DME or 500' QFE whichever is later
N52 30.5 W001 35.7
Birmingham 325
ILS DME BIRMINGHAM (110.1) IBIR (110.1) IBM
N52 27.4 W001 44.8
Birmingham ILS/DME
At IBIR 1 DME or 500' QFE whichever is later
Honiley VOR
HONILEY 113.65 HON
N52 21.4 W001 39.8
NOT TO SCALE
These SIDs require minimum climb gradients of
WHI 3D
286' per nm (4.7%) up to FL60.
WHI 3E
267' per nm (4.4%) up to FL60.
SIDs include noise preferential routings. No turn after take-off should be made before passing 825' (500' QFE). Cruising levels will be allocated after take-off by Manchester Control.
Do not climb above SID level until cleared by ATC.
Gnd speed-Kts 75 100 150 200 250 300
286' per nm 357 476 714 952 1190 1428
267' per nm 334 446 668 891 1114 1337
SID | RWY | TAKE-OFF/ROUTING | ALTITUDE
WHI 3D | 33 | Climb straight ahead to IBM 2 DME or 500' QFE, whichever is later, intercept HON R-329 to WHI NDB. | Cross D13 IBM at or above 4000', D17 IBM at or above FL50, D20 IBM at FL60.
WHI 3E | 15 | Climb straight ahead to IBIR 1 DME or 500' QFE, whichever is later, turn RIGHT, 170° track to IBIR 2 DME, turn LEFT, intercept HON R-020, intercept DTY R-323 to WHI NDB. | Cross D34 DTY at FL60.
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The Standard Instrument Departure (SID) for Birmingham International

exit the airway about 20 miles away and head south of the airport.

EXIT THE AIRWAY

When Dublin's DME shows you 20 miles away, exit the airway as follows. Turn left 45 degrees at a 20-degree bank and head 225 (if you were on autopilot, disengage it now). This heading will bring us to a fix approximately 16 miles southeast of Dublin VOR, where we will join the IAP. Also, begin your descent toward Dublin when you exit the airway. Do not descend lower than 2,400 ft MSL until you reach the appropriate fix on the instrument approach procedure.

Contact Manchester Control at 125.10 and notify them that you are descending toward Dublin. They will wish you well as you leave their auspices. Then contact Dublin approach at 121.1 and tell them about your intention to land there.

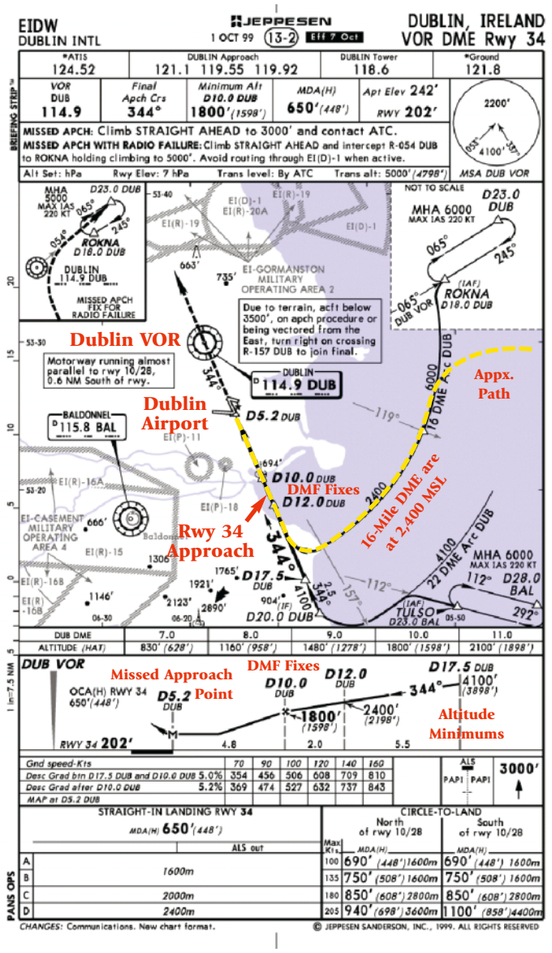
READJUST YOUR AIRCRAFT

With our altitude and flight phase changing, you need to adjust the aircraft accordingly. (1) Fuel mixture rich, (2) propeller RPM high, (3) landing lights on, (4) carburettor heat on and (5) altimeter consistent with local weather report.

JOIN DUBLIN APPROACH

The VOR/DME approach for Dublin's runway 34 shows a DME arc 16 miles from Dublin VOR. We will fly this arc until we reach the instrument approach path for runway 34. Here's a step-by-step method to execute this manoeuvre:

1. Continue heading 235 until the Dublin DME shows you 16 miles away. Then monitor your DME closely and adjust your heading as needed. Descend no lower than 2,400 ft MSL until you reach the fix that allows further descent.
2. If the DME shows your distance to Dublin VOR decreasing, turn left a few degrees so you will return to 16 miles. If it shows your distance from Dublin VOR increasing, turn right a few degrees until you are again 16 miles from Dublin. Repeat this procedure until you reach Dublin's 157 radial. Because this is a right-turn arc, you will make more right than left adjustments. By the time you turn toward the runway, your heading will be about 247.
3. When you reach Dublin's 157 radial, as shown on the chart, turn right at a standard rate and head toward Dublin VOR along its 344 radial, as shown on the chart. Remember to read our section on winds for advice!
4. When you are 12 miles from Dublin VOR along its 344 radial, you will be at fix D12.0, so descend at 500 feet per minute to 1,800 ft MSL and hold that altitude until the next fix, which is D10.0. Notice from the plan view of the instrument approach chart that D12.0 is 6.8 miles from the runway threshold. This is because Dublin VOR is 5.2 miles further on from the runway threshold.
5. When you are 10 miles from Dublin VOR, you will be at fix D10.0, so descend at 500 feet per minute toward the runway. Notice on the plan view that D10.0 is 4.8 miles from the runway. When you reach this fix, you have less than five miles to go.
6. Double check your aircraft configuration: gear down, landing lights on, carburettor heat on.
7. Descend no lower than 650 ft MSL, as shown on the chart, until you can see the runway and are properly aligned with it for landing. Notice on the plan and profile views that fix D5.2 is right at the runway threshold. This point is 5.2 miles from Dublin VOR. If you reach this fix and cannot see the runway or are not properly aligned with it for landing, you must abort your landing and execute a missed approach.
8. DO NOT attempt a landing if you are too far to left or right of the runway centreline or are too high. Forcing a landing from an inappropriate position is asking for trouble.



The arrival route into Dublin

MISSED APPROACH?

If you need to execute a missed approach, the chart tells and shows how to do it. (1) When you reach fix D5.2, which is right above the runway threshold, level off and power up. (2) Climb straight ahead to 3,000 ft MSL. (3) Fly toward Dublin VOR and notify ATC for instructions. (4) Once at Dublin VOR, await ATC instructions. (5) In lieu of ATC instructions, turn right 135 degrees and fly outbound on Dublin's 119 radial, then re-execute the approach from 16 miles DME.

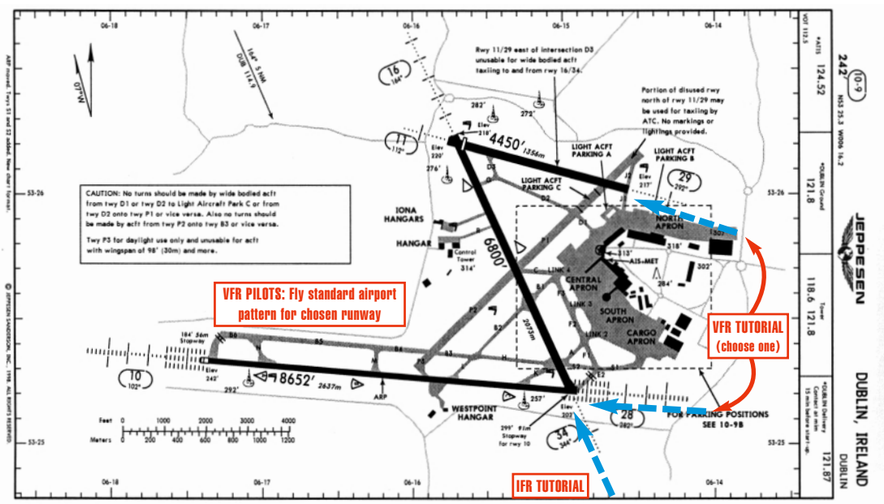
CONGRATULATIONS

You have successfully flown en-route from one airport to another using an airway and several VORs, you have practiced adapting to winds and you have executed a VOR/DME non-precision instrument approach. Well done, indeed!

Keep flying this tutorial to build your proficiency. Apply stronger winds and turbulence and advance to more sophisticated aircraft to make it more challenging if you like.

For more information about instrument flying, read Bill Stack's Instrument Flying for Flight-Sim Pilots at www.topskills.com/flitsim.htm. ■

Bill Stack



Dublin airport, showing the different runways you can use.

Battle of the Bulge!

Beating the guts out of the best graphics cards on the market.

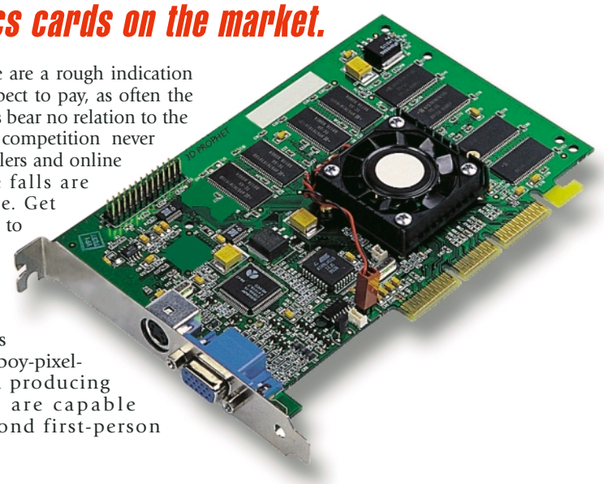
Several months ago, Flight Simulator 2000 (FS2000) slammed head-on into our world, dividing the community as people argued over whether it was a worthwhile investment. Many PCs buckled under the strain, causing a love/hate relationship to exist like never before. The performance of Microsoft's latest sim was not what most people expected, much less desired.

Today things are somewhat calmer as most have accepted the fact that this resource-hungry simulation will not perform like its older sibling, Flight Simulator 98, until we all have 1GHz processors and at least 256Mb of fast memory. In the meantime, a mystery surrounds the most recent batch of graphics cards. Is there any reason to consider one over another? Is there truth to the Internet hype that any 3D accelerator will give decent results with FS2000? To shed light on the matter and provide some definitive answers, we tested the daylights out of five of the latest, greatest video cards using FS2000 as the testing ground. Of course owners of other sims should read on – as the results of our tests give a perfect indication of overall ability (if a card can hack it with FS2000, then surely it can cope with lesser tasks!).

This was no easy task. FS2000 doesn't care too greatly what drives the video, as long as an efficient CPU and sufficient memory are present. Overall, our testing revealed this to be true. But what about resolutions above 1280 x 1024, 32-bit colour, visual quality, and view change performance? How about over-clocking? While not truly supported by most manufacturers, the fact is many people run their front-side bus speeds higher than the factory spec in an attempt to extract a few more frames per second. We've got some data on that as well. Just for good measure, we also included scores from 3DMark2000 and 3DMark99 (synthetic benchmark tests available from www.madonion.com).

Prices included here are a rough indication of what you can expect to pay, as often the manufacturer's RRPs bear no relation to the 'street price'. With competition never hotter between retailers and online merchants, price falls are a daily occurrence. Get walking or surfing to check out the best deals if you're considering a purchase!

Read on and let's see if these bad-boy-pixel-triangle-polygon producing printed boards are capable of anything beyond first-person shooter games!



SYSTEM TEST BED

ATX Case with 250 Watt Power Supply
ABIT BH6 Motherboard
Creative PCI64 Sound Card
DirectX 7a
Maxtor 5.1GB Hard Drive
AETI AFCS II Flight Yoke
Microsoft Flight Simulator 2000 with patch installed
Intel Coppermine 500E Pentium III (using an Iwill Slocket II adapter)
192 Mb PC133 ADRAM
Windows 98 SE
19" KDS Monitor
Samsung 8.4GB Hard Drive (FS2000)
Simped Vario Pedals

Notes:

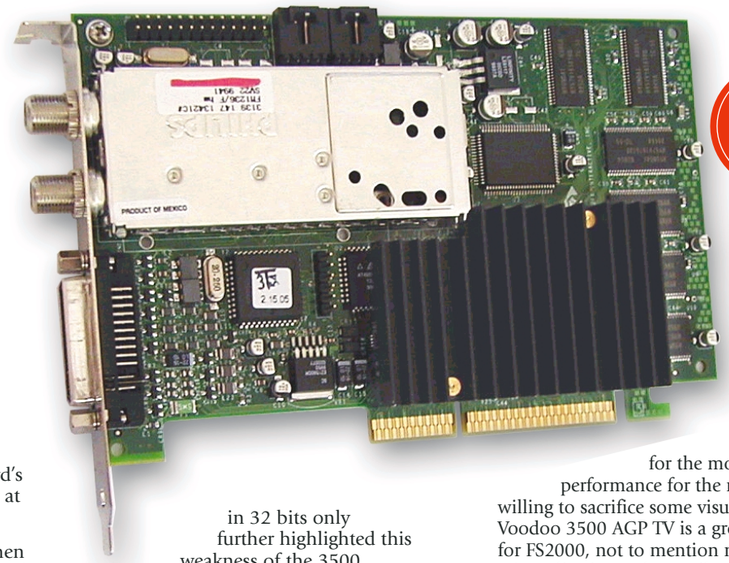
1. We developed and used several flight tests using as much variation as possible. Flights with dynamic scenery, heavy textures, clouds, rain, and from different perspectives. The flights were first set up as situation files, then an accompanying video was played and the average FPS (frames per second) recorded.
2. All nVidia boards performed better with the reference drivers version 3.77 than the manufacturers' builds, so that is what was used.
3. The only programs open during testing were Explorer, Systray, and FS2000.
4. All tests were done at 1280x1024 in 16 bit mode, but the display settings varied.
5. We've included scores for the TNT2 Ultra (tested originally in Issue 1) for comparison.
6. Keep in mind that when numbers as low as 8 or 9 frames per second are being compared, .6 or .7 FPS is significant (i.e. 8.88FPS versus 8.19FPS is 8% faster, certainly detectable).

FEATURES SUMMARY

Features	3dfx 3500	ATI Rage Fury	Creative Labs Annihilator Pro	Guillemot 3D 3D Prophet	Matrox G400 Max
Price (approx.)	£150	£200	£200	£200	£150
TV-out	Yes	Yes	No	Yes	Yes
AGP 4X	No	Yes	Yes	Yes	Yes
Memory	16MB	64MB	32MB	32MB	32MB
Core Clock	183	125	120	120	150
Memory Speed	183	143	150x2	166	200
DVD Support	Yes	Yes	Yes	Yes	Yes

3DFX VOODOO3 3500 TV 16Mb

Manufacturer: 3dfx
Web: www.3dfx.com
Price: £150 (approx)



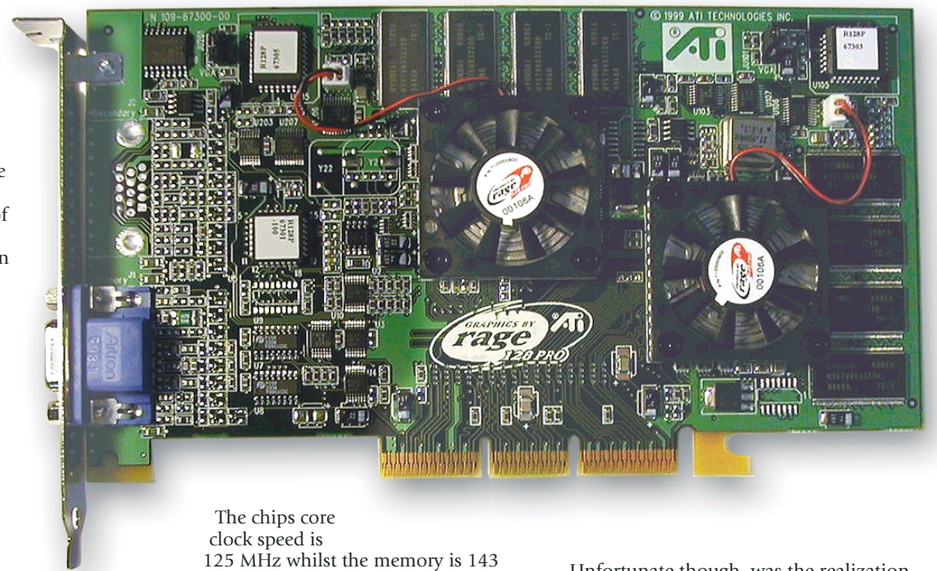
The top board from 3dfx is a complex package that comes with extra features like TV-out, FM radio (though only for non-European countries), DVD support, 183MHz core/memory speeds, great over-clocking stability and the lowest price tag in the group. Somewhat surprisingly for its relatively meagre 16Mb memory, this board's performance numbers were right at the top in many situations.

Where the 3500 fell short was when we pushed the envelope; clouds and rain slowed down the Voodoo more noticeably than the others and resolutions are limited to only 1280 x 1024 with 16 bit colours. The fact that the other boards all cranked out 1600 x 1200 in 32 bits only further highlighted this weakness of the 3500.

This board generated more heat than the others, but still ran flawlessly at higher bus speeds. We strongly suggest installing a fan, something 3dfx have left out in this otherwise well equipped card. For those of you looking for the most performance for the money and are willing to sacrifice some visual quality, the Voodoo 3500 AGP TV is a great video card for FS2000, not to mention more general PC applications. The retail version provides a giant blue cable spanning 7', a central AV 'Pod' for video and audio customization, Visual Reality (required for TV usage), Ulead's Video Studio, Intervideo WinDVD, and DirectX 6.1.

ATI RAGE FURY MAXX 64Mb

Manufacturer: ATi
Web: www.ati.com
Price: £200 (approx)



This recently released card from ATI comes equipped with twin Rage Fury 128 PRO chips on board. Each has 32Mb of memory at its disposal for a whopping 64Mb on a rather expansive and expensive card. ATI's proprietary MAXX (Multiple Accelerator) technology utilises the AFR (Alternate Frame Rendering process) to run OpenGL and Direct3D applications. What's all that mean? Simply this: one chip renders even numbered frames while the other handles the odd frames. Each chip processes the triangle setup for its own frame without waiting for the other, making AFR an efficient multi-chip processing technique. This is unlike SLI (Scan Line Interleave), whereby one chip draws even lines and the other draws the odd lines for each frame; or PGC (Parallel Graphics Configuration), another multi-chip technique where each chip draws ½ of the picture (either the top or bottom half of the screen).

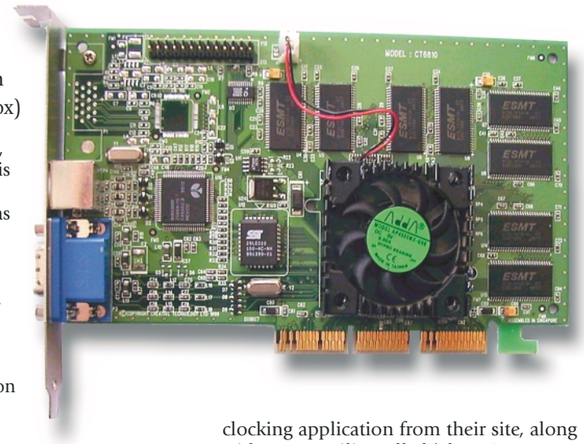
The chips core clock speed is 125 MHz whilst the memory is 143 MHz; both numbers noticeably lower than the TNT2 (which we tested in Issue 1) or the Voodoo 3 3500's. Does this matter? Overall, the Rage Fury MAXX performed right on par with the others, but was the undeniable leader when it came to looking around in the cockpit and panning from spot-plane view. The power to run smooth flights at 1600x1200 resolution with excellent image quality in both 2D and 3D make the Rage Fury MAXX a tough competitor.

Unfortunate though, was the realization that the drivers are not yet fully optimized for Direct3D, or at least for FS2000.

Although the first series of tests ran without incident, with further use of the board we experienced lockups during video playback within FS2000. New beta driver releases proved fruitless, but the good news here is that with time, this otherwise fine graphics board can only improve.

CREATIVE LABS ANNIHILATOR PRO 32Mb

Manufacturer: Creative Labs
Web: www.creative.com
Price: £200 (approx)



Like the 3D Prophet, the Annihilator Pro is based on nVidia's GeForce chip, but has a significant difference. It uses DDR (Double Data Rate) memory chips, which can transfer data at (you guessed it) twice the rate of SDR. The big question is " does the DDR memory make a difference?" Performance variations were very slight; in fact the supposedly less powerful 3D Prophet bested the Pro quite often. We discovered later that by increasing the bus and CPU speed, the DDR GeForce board started to show its stuff.

The retail version of the Annihilator Pro is impressive. The manual is written in 7 languages, with 30 pages of useful information in each section. DVD software, a full version of Evolva Scout and the driver installation CD are also found in the wrappings.

We must commend Creative Labs for being perhaps the most liberal company in the batch. One can download an over-clocking application from their site, along with a neat utility called 'The AGP Wizard', which easily allows for some fine-tuning of your AGP card if you are interested in getting the best possible performance.

Unfortunately, each time we used Creative's drivers, they performed noticeably slower than the nVidia reference build version 3.77. Other than that issue, this is a great card, with many features that unfortunately FS2000 cannot take advantage of.

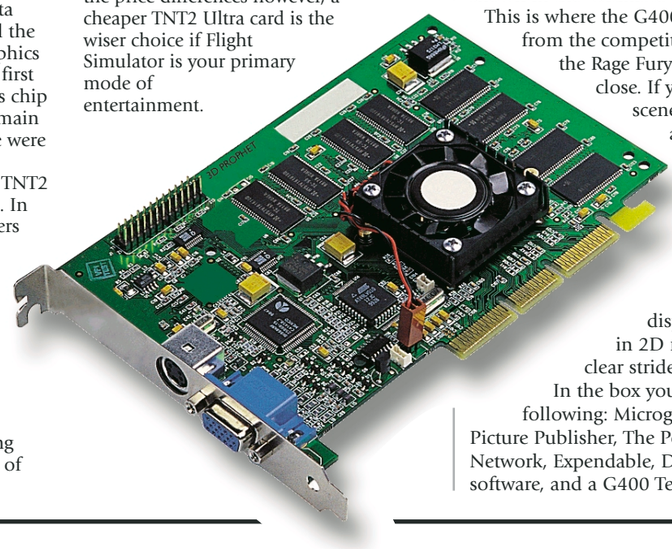
Unless you need the warm feeling that big numbers might give, you'd be best to save your money and buy the TNT2 Ultra board, which provides such similar performance in this environment.

GUILLEMOT 3D PROPHET (NVIDIA) 32Mb

Manufacturer: Guillemot
Web: www.guillemot.com
Price: £200 (approx)

Guillemot enters the battle with a GeForce equipped 32Mb AGP board, using the less costly SDR (Single Data Rate) memory chips. Having read all the hype about the on-board GPU (Graphics Processing Unit) when GeForce was first launched, we wondered whether this chip could relieve the overworked CPU (main PC processor) during our flights. We were rather disappointed, as the Prophet looked and behaved exactly like the TNT2 Ultra board we had tested in Issue 1. In fact, Windows self-installed the drivers during boot-up, simply using the same nVidia reference drivers that the previously installed Ultra had used. The performance and visual characteristics are nearly identical, leaving us wondering why they designed this chip in the first place. It seems doubtful that nVidia were thinking of the millions of flight simulation enthusiasts, perhaps being more enamored with the attractions of Lara Croft.

Despite this, this card was stable, provided good visuals, and took our 124MHz-bus speed (82MHz AGP bus) without fuss. Performance, as stated before, was essentially the same as the TNT2 Ultra, which takes nothing away from it. Given the price differences however, a cheaper TNT2 Ultra card is the wiser choice if Flight Simulator is your primary mode of entertainment.

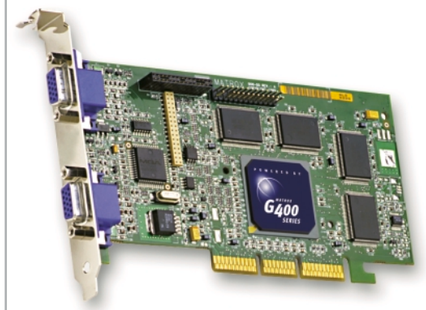


MATROX G400 DUAL-HEAD MAX 32Mb

Manufacturer: Matrox
Web: www.matrox.com
Price: £150 (approx)

The Matrox Millennium G400 Max walked away with the blue ribbon, getting high marks in all categories. We simply could not find any weaknesses or any reason to want more from this board. Matrox has done a superb job blending everything together at a cracking price.

The G400 offers Dual-Head multi-display (see our multi-monitor piece this issue for the fantastic possibilities this offers), 32Mb of memory, a 360MHz RAMDAC (the on-board chip that converts three digital colour signals to one analogue signal for your monitor), DVD support,



TV-out, rock-solid stability and horsepower for high resolutions and colours. The G400 Max is no pretty-boy either, it can paint pixels at 1600 x 1200 in 32 bit colours in 3D extremely well, as shown in the 'Ultimate' flight test below. This is where the G400 separates itself from the competition, with only the Rage Fury MAXX coming close. If you prefer to view scenery in high detail and your system is strong enough, look no further than here. The Millennium G400 MAX also displays wonderfully in 2D mode and is a clear stride ahead of the rest. In the box you get the following: Micrografx Simply 3D, Picture Publisher, The PointCast Business Network, Expendable, DVD player software, and a G400 Technology Demo.

THE ULTIMATE FLIGHT TEST

This flight was created to see what cards might buckle at the knees when pushed as hard as FS2000 could go. We first over-clocked the system bus to 124MHz, bringing the CPU up to 620MHz. This means the AGP bus, which is supposed to run at 66MHz, is now operating at 82MHz, well above specification.

Two different screen resolutions were used, 1280 x 1024 and 1600 x1200 in 32 bit. The 'Image Quality' was set to maximum (all sliders full right), with all boxes ticked. Weather was set with cumulus cloud, 5/8 coverage from 1500-5000ft, cruise altitude over New York City was 7000ft.

1280 x 1024 x 32	3dfx 3500	ATI Rage Fury MAXX	Creative Annihilator Pro	Guillemot 3D Prophet	Matrox G400 Max	CL TNT2 Ultra
Ultimate Test	Not supported	9.47	9.53	9.48	9.71	9.38
1600 x 1200 x 32	**3dfx 3500**	**ATI Rage Fury MAXX**	**Creative Annihilator Pro**	**Guillemot 3D Prophet**	**Matrox G400 Max**	**CL TNT2 Ultra**
Ultimate Test	Not supported	8.56	8.19	8.26	8.88	8.06

All figures are frames per second in FS2000.

FLIGHT TEST COMPARISON RESULTS

	3dfx Voodoo3 3500	ATI Rage Fury MAXX	Creative Labs Annihilator Pro	Guillemot 3D 3D Prophet	Matrox G400 Max	Creative TNT2 Ultra
Test E1	16.19	15.81	15.75	16.55	16.17	16.48
Test D1	13.23	11.49	11.63	11.90	11.22	11.86
Test D2	17.10	16.41	16.39	16.55	16.52	15.82
Test M1	21.77	20.78	20.03	20.09	19.66	19.52
'NASTY'	14.71	15.35	15.97	15.68	14.91	15.20
3Dmk99	3672	3395	4103	4173	3606	Failed
3Dmk2000	2672	3169	4063	3805	2869	3074

All figures (excluding 3Dmk tests) are frames per second in FS2000.

Test E1: Extremely Dense scenery using the Mooney, departing EGGL, touring London, returning for landing RNWY 27L.
Test D1: Extremely Dense, Dynamic Scenery on, C182 at O'Hare, at night.
Test D2: Same as above, daylight at San Francisco.
Test M1: 1-minute flight in Himalayas Mountains, spot plane view.
Nasty: Short flight across Manhattan at night, with low clouds, rain, and scenery full on.
3Dmk Tests: Bigger numbers means faster processing power.

Conclusion

While none of these boards is likely to disappoint, two of them stood out slightly from the others. While we would award the runner's up prize to the 3dfx Voodoo 3500 for good value, the clear winner is and Our Choice is the Matrox G400 Max.

Spending your money on this will give you excellent picture quality in 2D and 3D, very good 3D performance with high resolutions available with minimal performance loss. It is also very stable, important given that graphic cards can cause all sorts of crashes. Finally the dual-monitor facility alone adds a compelling reason to rush out and buy if you have a spare monitor lying around unused. ■

Greg Gott

RATINGS

	3dfx 3500	Rage Fury MAXX	AnnihilatorPro	3D Prophet	G400 Max
	3dfx	ATi	Creative Labs	Guillemot 3D	Matrox
Performance	4	4	4	4	4
Visual Quality	3	5	4	4	5
Stability	5	3	4	4	5
Price	5	2	2	3	4
Overall Mark					

Expand your Horizons!

Plug into the world of multi-monitor flying

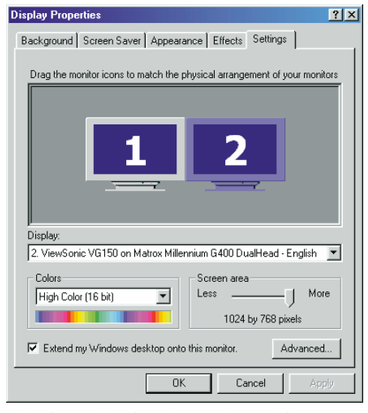
We've probably all seen them, be they at a computer show or in last month's 'Southampton Super Sim' feature, but how does one set-up multiple monitors for flight simulation use? Plenty of you have asked, so we've called in the assistance of an expert, Katy Pluta.

Katy is a key member of the Professional Flight Displays (PFD) team, who specialise in designing software for multiple monitor and network configurations. So, who better to guide you through the maze of cables and cards?

Combat Flight Simulator with an additional map view on the secondary display

For all simulator pilots, Windows 98 and Windows 2000 operating systems incorporate a very interesting standard feature: the ability to run multiple monitors using several video cards. There are many ways to take advantage of this feature. You could run your simulator on one screen and use the other to work or browse the web during a transcontinental flight. You could add external or map views of the simulator to the main cockpit view and display them on the secondary monitor. Alternatively you could move the instrument panel (or an additional program window such as a 'moving map' or flight planner) to another screen and keep the flight simulator displaying the view out of the window on your main monitor. The possibilities are endless!

Running several external, cockpit or map views on several monitors is a very appealing thought but not always ideal technically. This is because the same machine set-up (the processor and RAM) has to generate and process each view. This impacts on the overall program performance and, it has to be said, severely in the case of Flight Simulator 2000.



Windows Display Properties with multiple-monitors

The main advantage of adding a second display while running a program such as Microsoft Flight Simulator is to either move the panel to a secondary display or

JARGON BUSTER

Don't know your API from your AGP? A quick guide to those pesky acronyms and other useful words used.

AGP: Accelerated Graphics Port, Input/Output interface.

API: Application Programming Interface, set of routines/functions that an application program uses to request and carry out lower-level services performed by the operating system. For example, in Windows, APIs manage icons, windows, menus and elements.

BIOS: Basic Input/Output System that provides the basic instructions for controlling system hardware.

Direct3D: 3D graphics programming API

DirectX: 3D graphics programming API written by Microsoft.

Drivers: Software used to communicate with or manage hardware.

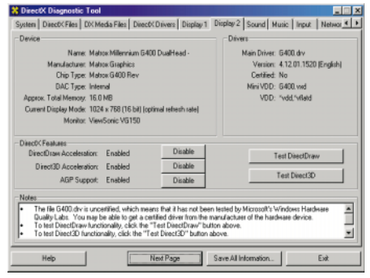
fps: frames per second. A measure of how smoothly the simulation is displayed – higher the better.

OpenGL: 3D graphic programming API written by Silicon Graphics.

QuickMap: Moving Map utility (see 'Web Links' box for details).

PCI: Peripheral Component Interface, Input/Output bus.

RAM: Random Access Memory.



DirectX diagnostic tool window

WINDOWS 2000 & MULTIPLE MONITORS

Windows 2000 is the latest operating system released from Microsoft and is not intended to replace Windows 98, but is the successor to Windows NT4. Windows 2000 also comes with a built-in multi-monitor support with some differences to Windows 98. Full OpenGL support with multi-monitor is not disabled, as in Windows 98, and depending on video card driver compatibility you can switch between your primary and secondary displays within the operating system.

Flight Simulator 98 Boeing 737-400 over Hong-Kong

WATCH THOSE FRAME RATES!

We tested a typical set-up to see how frame-rates were affected by using multiple monitors and different view options.

Combat Flight Simulator

Single 1024*768 virtual cockpit window on primary display - **50 fps**

With an additional 500*370 map view on secondary display- **15 fps on both displays**

Flight Simulator 98

Single 1024*768 cockpit window on primary display - **58 fps**

With an additional 1024*768 spot view on secondary display - **10 fps on both displays**

Flight Simulator 2000

Single 1024*768 cockpit window on primary display - **30fps**

With panel windows moved to the secondary display - **38 fps**

Flight Simulator 2000

Single 1024*768 cockpit window on primary display - **18fps**

With FSNavigator window moved to the secondary display - **18 fps**

Conclusion: additional view windows severely impact on the simulation's performance, while undocking the panel view and moving it to a secondary monitor improves or does not impact on the performance of the primary display.

Test set-up was a Celeron 400 MHz with 128 Mb RAM and variety of video cards.

use it to render a flight planner or moving map window. For that you will need at least one extra monitor of course, two video cards or a card that incorporates a 'dual-head' feature (that can run two monitors off a single graphics card - like the Matrox G400 for example). However, there are several limitations and requirements that you need to be aware of before you do anything…

Firstly, if the primary display can run in 'full screen' mode, any additional display will be rendered in windowed mode. In other words, you cannot run several 3D APIs in accelerated mode simultaneously. For example: if you use the utility 'QuickMap' from Enrico Schiratti (see Web Links & Contacts box), that uses OpenGL, this will be rendered in 'software emulated mode' on the second screen, while the simulator will be accelerated under DirectX Direct3D on the primary display. Furthermore, you are limited to using AGP and PCI cards only.

Secondly, graphic cards, and more importantly their drivers, must be multi-monitor compatible. To see if they are, you will need to read the file 'display.txt' that is located in the 'Windows' directory on the hard-drive of your computer and/or check with your video card manufacturer. If your motherboard comes with an AGP slot you will need an AGP card and one (or several) PCI cards.

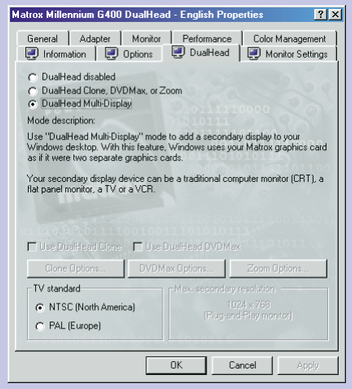
TWO HEADS BETTER THAN ONE

The Matrox G400 Max DH (Dual Head) is an AGP video card that can support two separate displays in several modes:

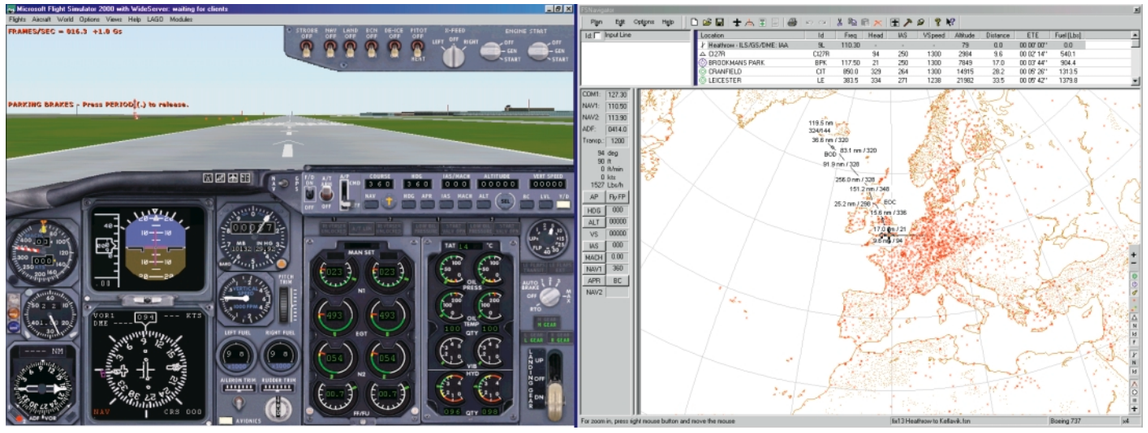
- Multi-display: to use two different screens
- Clone: twice the same screen displayed
- Zoom: to use the secondary display to view a zoomed-area of the primary display
- DVDMax: to play a video on the monitor and watch it at the same time full-screen on a TV

The two most common modes used when flying with flight simulators are:

- Multi-display (two monitors) to render the scenery on the primary monitor and panel on the second.
- Dual-Head 'Clone' to simulate the two front cockpit windows of the Captain and First Officer within the same view.



Matrox G400 multi-display feature



Flight Simulator 2000 Boeing 737-400 ready for departure at EGLL 9L Heathrow, to BIKF Keflavik, Iceland with FSNavigator v3.0

Unfortunately, several undesirable situations can occur, depending on your motherboard's BIOS. If the main monitor defaults to PCI then you will NOT be able to use your AGP adaptor as the primary card. In which case try to obtain a BIOS update from your motherboard's manufacturer. If the main monitor defaults to AGP then things are generally OK. Or you may find that the BIOS gives you the choice of AGP or PCI as your primary adaptor with an option in its set-up.

If there are only PCI slots then it is a matter of which slot gets initialised by the BIOS first. In this case you will simply need to change slots to 'set' the primary card.

Once the cards are physically installed in your system, launch Windows. Windows will automatically detect and install the new cards and prompt you to reboot to update the configuration files and initialise the displays.

To use your secondary monitor follow this procedure:

Click 'Start'… 'Settings'… 'Control Panel'… 'Display'… and then the 'Settings' tab. Select your new display and check the 'Extend my Windows desktop onto this monitor' box. Drag the screen 'icons' to match the physical layout of your monitors - and that's it! You are now ready to move views around.

Now it's time to put the instrument panel on your second monitor. Launch Flight Simulator and right-click on the instrument panel and select 'Undock this window' then drag it to the other monitor (if you are running another simulation then read the manual to find out if you can set-up multiple views in Windows). You can open new views and undock them the same way to move them around. If you want to run another application, launch it, and drag its window to the monitor you want it to be displayed on.

Congratulations, you are now officially a multi-monitor user! ■

Katy Pluta

FIVE RECOMMENDED COMBOS

To save you heartache and trips to your local PC supplier to return incompatible graphic cards, we tested several configurations based on different monitor set-ups. We encountered no problems when installing and running the following video cards together (the view or program we ran on each screen is also included). However, make sure that you install the latest drivers available from the manufacturer. Note: S3 cards are not officially supported as a secondary adaptor with Windows 2000.

	Primary	Secondary	Tertiary
1.	G400 Scenery	G400 Instrument Panel	3Dfx Banshee PCI 4Mb FS Navigator
2.	G400 Scenery	G400 Instrument Panel	S3 Virge PCI 4MB FS Navigator
3.	3Dfx Voodoo 3 AGP 16Mb Scenery	3Dfx Banshee PCI 16Mb Instrument Panel	S3 Virge PCI 4 Mb FS Navigator
4.	3D Real Starfighter I740 AGP 8Mb Scenery	3Dfx Banshee PCI 16Mb Instrument Panel	S3 Virge PCI 4 Mb FS Navigator
5.	Velocity 4400 TNT 16Mb Scenery	3Dfx Banshee PCI 16Mb Instrument Panel	S3 Virge PCI 4 Mb FS Navigator

Flight Simulator 2000 Concorde ready for departure at EGLL 27L Heathrow

Flight Simulator 2000 Mooney Bravo on a night approach to KSFO 26L San Francisco, CA with the IFR panel

WEB LINKS & CONTACTS

Microsoft's knowledge base article on hardware requirements for multiple display support in Windows 98
http://support.microsoft.com/support/kb/articles/q182/7/08.asp

Microsoft's Windows hardware compatibility list
www.microsoft.com/hcl/default.asp

Realtime software multi-monitor resources with a video card database
www.realtimesoft.com/multimon

Matrox Electronic systems Ltd
Phone: +44 (0)1753 665522
Fax: +44 (0)1753 665599
e-mail: graphic.tech.uk@matrox.com
Web1: www.matrox.com/
Web2: www.matroxusers.com

3DFX
Customer Service Manager:
techmgr@3dfx.com
Technical Support:
emailsupport@3dfx.com
Web1: www.3dfxgamers.com
Web2: www.3dfx.com

S3
Phone: +44 (0)1189 444444
Fax Support: +44 (0)1189 444445
Web1: www.s3.com/
Web2: www.diamondmm.co.uk

Real 3D
Web1: www.real3d.com
Web2: customersupport@real3d.com

Nvidia
Web: www.nvidia.com

FS Navigator is a great Flight Simulator utility by Helge Schroeder
http://fstools.simflight.de/

QuickMap from Enrico Schiratti
www.schiratti.com

Virtual Airlines — The Guide

Our ultimate guide to the best Virtual Airlines

By Mike Hambly

Fed up with flying on your own? Fancy yourself as a real airline pilot? We think we have found the very thing that can offer you friendship, fun, new challenges and the chance of promotion to captain or manager of a major airline. In fact there is a whole new way of enjoying flight simulation by becoming a member of a Virtual Airline (often referred to as a 'VA').

PC Pilot has been taking a tour around the world of VAs. Many are now recruiting for pilots and managers. Age does not matter and for the less experienced among you, please do not be put off, as there is a place for everyone. If you can take off and fly a circuit, then you have the makings of becoming a Virtual Airline captain! And of course please do write to us and let us know how you get on.

Please note: that the 'virtual' commercial airlines mentioned below have no official association with the carrier of the same name. But who are we to spoil your fun? So go fly your favourite airline anyway!

ACE Airline Charter Enterprises.

ACE (Airline Charter Enterprises) offers something new for a Virtual Airline. Unlike others, ACE encourages you to be in charge of your own destiny. Earn money for each flight you undertake and with the proceeds maintain your existing aircraft (and increase its reliability), or purchase a larger or faster aircraft.

As an ACE pilot, you can undertake more than the standard commuter run, with interesting missions, such as carrying a band of mercenaries to a remote landing strip, or ferrying a load of contraband to a major international airport (avoiding customs of course!). The higher the risk, the more you get paid! And naturally, some missions only become commercially viable when you upgrade to a larger aircraft - so work hard and you may find yourself flying anything from an old bomber to a sleek DC-10.

You begin with your own aircraft, a rusty old DC-3, and earn money for each flight you take. With the money that you earn, you must decide whether to maintain your existing aircraft or purchase a new one. However, watch out! For if you don't maintain your aircraft correctly, its reliability will suffer, and you may find yourself trying to complete a mission with one engine out, or worse!

Contact: David Edwards - President, Founder & CEO
E-mail: aceboss@flyace.com
Web: http://flyace.com/cgi-bin/miva?miva/login/index_frame_1.mv

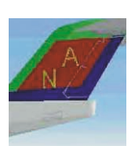
Air Kent

Air Kent is a VA from London. They currently operate the Airbus A320 family and BAe 146s from its main hub, Gatwick South Terminal. Being directly linked to London via the Gatwick Express, this makes an ideal base for an upcoming charter & scheduled airline. They claim to offer high quality flights with aircraft to match.

Contact E-mail: webmaster@airkentuk.co.uk
Web: www.airkentuk.co.uk/

Air Newcastle Virtual Airline

Tommorows Virtual Airline Today



Air Newcastle Virtual Airline is a part of Gatwick Virtual Holdings. This small but friendly airline based at Newcastle runs daily flights to London Heathrow, Barcelona, Paris, New York, Dalaman, Corfu and many other destinations.

Contact: Mark Griffiths
E-Mail: air.newcastle.va@tinyonline.co.uk
Web: http://users.tinyonline.co.uk/air.newcastle/welcome.htm

British Airways Virtual Airline

British Airways Virtual Airline

BAVA operates from London Gatwick International Airport. The majority of BAVA flights go from the North Terminal, with a small number from the older South Terminal. The aerodrome diagram for Gatwick (EGKK) is available on their site. At present, there are positions for 50 pilots with BAVA.

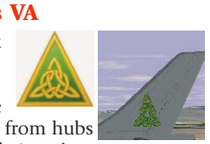
Contact: John Warren - CEO
E-mail: www.geocities.com/bava_uk/contact.htm
Web: www.geocities.com/bava_uk/index2.htm

Caledonian Virtual Airways

Caledonian Virtual Airways was conceived in October 1999. Caledonian Virtual Airways plans to emulate the operations of Caledonian Airways operating Airbus A320, L1011 and DC-10-30 aircraft.

Contact: Wayne Gough - Chief Executive
E-mail: gen@caledonianvirtual.freeserve.co.uk
Web: www.caledonianvirtual.freeserve.co.uk/main.htm

Celtic Airways VA



In case you hadn't guessed, this is a VA with an Irish theme, serving the world and Europe from hubs in Dublin to North America, Asia and Europe. Its new hub in Rome serves Africa, Asia and the Middle East. It also operates a commuter division within Ireland and Europe.

Contact: B. Collins
E-mail: admin@celticairways.bn3.com
Web: www.geocities.com/CapeCanaveral/Hangar/3989/

Florida Air

Florida Air is a Miami-based VA, which offers daily flights to many cities in the south eastern USA, the Bahamas and Caribbean.

Contact: Walter Wilson
E-Mail: nwallie@hotmail.com
Web: www.power-cwi.com/fa/

Gatwick Virtual Aviation Holdings

Gatwick Virtual Aviation Holdings is a group of Virtual Airlines. If you decide to join this group you will be able choose which airline you want to fly for. They are a virtual organisation that flies smaller (light singles, twins and executive jets) aircraft from London Gatwick to hundreds of destinations in the UK and the rest of Europe.

Contact: Mathew Salmon
E-Mail: vince@gatwick.demon.co.uk
Web: www.gatwick.demon.co.uk/

Meridian Virtual Airline

Meridian Airlines was developed to give all flight simulator pilots of all ages and skill levels a realistic, yet enjoyable experience through the deletion of certain real airline characteristics. Interestingly, for novices, Meridian offers online classrooms for flight training.

Contact: Bob Klemm
E-Mail: bobklemm@bellsouth.net
Web: www.avsim.com/meridian/

Orange Air

Orange Air has been set up by and for enthusiasts. Their stated goal is 'to let you have more fun with Microsoft Flight Simulator'. They offer a timetable with flights all over the world, some good aircraft, active hub management and lots of fun!

Contact: Martijn van Boxtel
Orange Air President
E-Mail: aartjan@igr.nl.
Web: http://orangeair.horizon.nl/english/

Pacific Coast Virtual Airways

Pacific Coast Airways was originally set-up to serve the greater West Coast of Canada. It has now grown to serve all the way from Alaska to Southern California.

Contact: Matthew Salmon
E-Mail: pacificcoastva@hotmail.com
Web: http://pacificcoastva.hypermart.net/

SATCO

While not a VA, SATCO is widely used by VA pilots to add an even greater degree of realism. By connecting to the SATCO network, simulation pilots can get access to real time services from Air Traffic Controllers. SATCO provides users, both veteran and novice alike, with a resource to enhance their enjoyment of the ProController and SquawkBox programs. SATCO has training sessions for controllers and pilots who want to learn more about air traffic control procedures.

Executive Director - Randy Whistler
E-Mail: satco1@satco.org
Web: www.satco.org/

Solent Air

Solent Air commenced operations on March 1st, flying out of Southampton and Bournemouth International Airports. Flights are to UK and European destinations using mainly turbo-prop aircraft, though their largest aircraft is a B757.

Contact: Mike Shergold
E-Mail: mjs@solentair.co.uk
Web: http://solentairlines.homestead.com/home.html

Southwest Virtual Airline

Southwest Virtual was started in early April of last year, modelled off the real-world Southwest Airlines. Many steps have gone into making this virtual airline realistic, enjoyable, and comparable to what you would find with other giants of the industry.

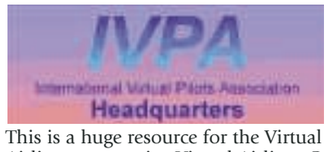
Contact: Wes Archibald – Hub Captain
E-mail: nightflyer@mediaone.net
Web: www.flightsimmers.net/swva/bur/burops.html

Virgin Atlantic Virtual Airways

Virgin Atlantic Virtual Airways is the virtual airline designed by Virgin Atlantic enthusiasts, for Virgin Atlantic enthusiasts. A great British Virtual Airline, the site is full of detail and colour. A virtual tribute to Richard Branson.
Please note that as we went to press that we received a note from VAVA that Virgin had objected to this VA and thus there is the possibility that this VA may be forced to close.

Contact: L.Mallon
E-Mail: LMallon33@aol.com
Web: http://members.aol.com/LMallon33/Main.html

Virtual Airlines.Com



This is a huge resource for the Virtual Airline community. Virtual Airlines.Com is a unique site that the owners say, "is the gateway to the hobby of Virtual Airlines."

Contact: Jonathon Witherspoon
E-Mail: atc@virtualairlines.com
Web: www.planetaviation.com/virtualairlines/

Virtual Pan American World Airways

The airline was created purely to preserve the proud heritage of the most magnificent airline the world has ever known (according to the owners of this VA anyway!). Virtual Pan American World Airways are also hiring, so drop by and sign up. ■

Contact: Adam Ehrlich
E-Mail: vettezz4@worldnet.att.net
Web: http://flypanam.hypermart.net/www/home.htm

More Great Flight Sim Downloads!

You liked it so much, we've done it again!

Following last issue's feature of how to get some cracking products for nothing, we've been deluged with readers clamoring for more Internet freebies.

Here's our pick of the latest and greatest downloads that we think you will enjoy using. Some we looked at were not worth printing. We hope that there is something here for everyone. If you are new to the Internet or downloads then do grab a copy of Issue 3 where we provide a gentle introduction. For those who have had difficulty – it is worth persevering, we promise! Let us know how you get on or if you find a gem that you think other readers might enjoy.

By Mike Hambly

Flight Simulator 2000 Aircraft

British Airways Boeing 757-200

British Airways Boeing 757-200 (new markings). Features include moving parts (flaps, spoilers, engines, landing gear), transparent cockpit, vapor trails, realistic flight dynamics and Boeing 757 checklists.

Authors. Bill Alderson and Chris Jephcott
Web: www1.flightsim.com/cgi/kdlr/main/30/ba757-2k.zip?TK9MP01T

Japan Air Lines 747-SR46

This aircraft, JA8117 was the first 747-SR built and was delivered on September 26th, 1973. The SR was designed for domestic high-density flights.

Authors: Chris Shelly, Alessandro Dallago, Bill Alderson
Web: www.avsim.com/cgi-bin/library/jump.cgi?ID=4462

KLM Cityhopper Fokker F-27 Mk.500

A completely new F-27 with new flight dynamics and high-resolution 512x512 textures. The gear retracts, the nose gear is steerable, the props look like the real thing and the transparent cockpit windows give a clear view of the flight crew. To keep the passengers happy there is even a stair so they can board the aircraft!

Author: Rob Bennis
Web: www1.flightsim.com/cgi/kdlr/main/ 30/f275city.zip?TK9MP01T

Airbus A340-313E - Cathay Pacific.

All moving parts, accurate bitmap textures. Very accurate flight model, and transparent cockpit windshield.

Author: Yannic Cathalina
Web: http://home.no.net/flight/cx340313.zip

All Nippon Ariline (ANA) 747-SR

Great 747 with cool night light effects!

Authors: Esa Kaihlanen, Bill Alderson and Chris Shelly
Web: http://home.no.net/flight2/772ja201.zip

Flight Simulator 2000 Panels

Cessna 182S

This is perhaps the most visually realistic and accurate panel ever produced for Flight Simulator. DreamFleet 2000 has taken photo-realism to new heights, and it's all here in this Cessna 182 panel, a preview of things to come from DreamFleet.

Author: DreamFleet 2000
Web: www.avsim.com/cgi-bin/library/jump.cgi?ID=4447

Boeing 757/767

Olav Rønningen of The Freeware Panels Designers Association has released a brand-new FS2000-only panel for the Boeing 757 and 767 series.

Author. Olav Rønningen
Web: http://home.no.net/flight2/omr757fs2k.zip

Flight Simulator 2000 Scenery

Scenery for Hong Kong Kai Tak Airport

Although now not used, this still remains a favourite.

Author. Thomas Kwong
Web: http://home.no.net/flight2/kaitak2000.zip

Leeds Bradford Airport

Closer to home, this is enhanced scenery for Leeds Bradford airport in the UK.

Author. Tom Stewart
Web: www.flightsim.com/cgi/kdl/main/33/leeds.zip?6rwW003f

Spain Global Scenery 2000

A VFR/IFR scenery. Highlights include a detailed Madrid Barajas Airport, mesh-terrain mountains, inner city buildings, up to 31 villages in the Madrid area with unique buildings and much more.

Author: Pedro Aviles
Web: www.flightsim.com/cgi/kdl/main/33/madrid2k.zip?6rwW003f

Flight Simulator 2000 Sounds

Enhanced Thunder

A complete set of enhanced default Thunder .wav files (the sound format used for effects by Flight Simulator, sometimes also referred to as 'wavs'). These wavs have been converted to stereo and Mike has added volume plus spatial surround sound. Now you really hear the rolling, cracking thunder around you!

Author: Mike Hambly
Web: ftp://ftp.avsim.com/fs2000_sounds/th2kb.zip
Web: www.avsim.com/cgi-bin/library/jump.cgi?ID=4240

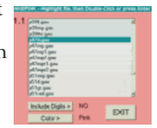
Boeing 767 Sound Package

Engine sound recorded from an actual JAL Boeing 767-346(P&W JT9D-7R4D). Note you will need both files.

Author: Ryuji Ozawa
Web: www.avsim.com/cgi-bin/library/jump.cgi?ID=4284>
Web: www.avsim.com/cgi-bin/library/jump.cgi?ID=4283>

Flight Simulator 2000 Utilities

MakePink Gauge Lighting Utility



Adds the soft pink night lighting to gauges. This latest version works with more gauges and a new option adds FS98-style night lighting to unlit gauges. An added utility changes the FS2000 GPS gauge background lighting. Requires Visual Basic 4.0 driver files (which should already be installed, depending on your version of Windows).

Author: Chuck Dome
Web: www1.flightsim.com/cgi/kdlr/main/31/mkpink11.zip?TK9MP01T

Fast Start Extension

Enables you to choose the flight FS2000 starts up on. This product has been enhanced all round and includes some new features. It includes a setup program for easier installation.

Author: Ken Maclachlan
Web: www1.flightsim.com/cgi/kdlr/main/17/fsx-2000.zip?TK9MP01T>

Flight Simulator 2000 Adventures

MV challenge - Concorde flights

Learn to fly Concorde as realistically as you can from London to New York along supersonic tracks, with very detailed instructions. Then apply your skills to historic or current scheduled flights by BA and Air France, with varying weather and levels of difficulty. No other files are needed.

Author: Michael Vone
Web: www.avsim.com/cgi-bin/library/jump.cgi?ID=4487

Fly! Scenery

Seattle Scenery

Covering roughly 2,500 square miles including the city of Seattle and parts of Puget Sound, this add-on for Fly! will blow you away! Todd's Seattle scenery was generated using digital maps from the USGS, and includes accurate roads and coastlines for true VFR flight. Airports include SeaTac, Renton, Snohomish, Bremerton and several other smaller strips. You've never flown anything so real in your life!

Author: Todd Klaus
Web: www.unofficialfly.com/seattle/index.htm#Get

Flight Simulator 98 Aircraft

Queen's Flight BAe 146-200

The Queen's Flight BAe 146-200 is a four-engined turbofan airliner operated by the RAF as part of No. 32 (The Royal) Squadron. These planes fly military and government VIPs as well as the Royal Family.

Authors: Bill Alderson and John Burtenshaw
Web: www1.flightsim.com/cgi/kdlr/main/18/bae146b3.zip?TK9MP01T

Hawker Siddeley 748

The HS 748 turned out to be a very popular DC-3 replacement, with 352 ordered by 1980. BAe (Hawker Siddeley's successor) continued to improve the basic aircraft, and most 748's are still flying today.

Author. Harry Follas
Web: www.flight-sim.iup.edu/files/uploads/ill748.zip

BOAC Series 312 Britannia.

George Vega has painted his Britannia into the classic and formal livery of British Overseas Airways Corporation, BOAC. BOAC used these in trans-Atlantic service until the pure jets arrived in force, and then used them on secondary/shorter routes.

Author: George Vega
Filename: br312ba3.zip
Web: www.flight-sim.iup.edu/files/uploads/b/br312ba3.zip

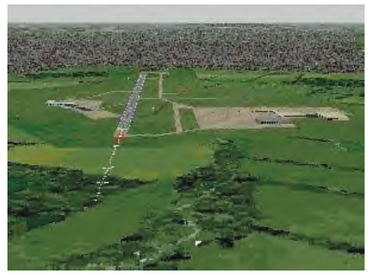
Flight Simulator 98 Scenery

London Heathrow

London Heathrow (LHR). Freeware static aircraft for use with English Airports for Flight Simulator 98.

Author GB Airports Project
Web: www1.flightsim.com/cgi/kdlr/main/19/englhrst.zip?TK9MP01T

West Midlands



This is the third release of the West Midlands scenery. Included are: Birmingham, Brize Norton, Coventry, Enstone, Halfpenny Green, Honiley (disused) and Nympsfield. The motorway network around Birmingham, basic urban areas of Birmingham and the Black Country are also featured. Would make a nice addition if you are following Bill Stack's tutorials!

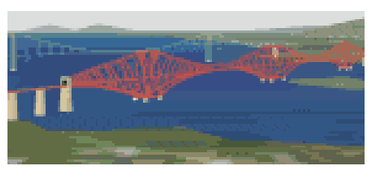
Author:Nick Challoner
Web: www.magrathea.clara.net/Scenery/uk-wm03b.zip>

All of Wales and Western England

This includes all Pooley's-listed airfields for the area, plus Llanbedr, accurate mountain elevations, antennae and other man-made obstructions. There are also seasonal mountain textures in Snowdonia, lighthouses and other visual reference points, buildings in cities, significant bridges and plenty more.

Author: Paul Michaels.
Web: www.pmphineas.freeserve.co.uk/Wales.zip

Scotland



For those who like deep-fried Mars bars, this scenery of Scotland is thoroughly recommended. Also includes all the Scottish RAF Aerodromes. ■

Author: Bob Wittick
Web: www.uk-flightsim.org.uk/ukdt/downloads/scotld50.zip

Product Listings

Comprehensive listing of the most popular products, as listed by RC Simulations in Bristol.

We've also included a rough compatibility guide of add-ons that may or may not work with Flight Simulator 2000 too. Where listed as FS2000 this means the products are designed and adapated to run with Flight Simulator 2000 without any problems or bugs. Where 'Partial' compatibility is listed, this means that only some of the product may work or bugs or unacceptable glitches may appear in some or most of the product. As always, if in doubt check with the supplier or publisher before purchase to clarify any concerns.

JOYSTICKS AND THROTTLES

Product	Manufacturer		Price (RRP)
CH Flightstick PC	Virtual Reality		£29.95
CH Mach 1 Joystick PC	Virtual Reality		£19.95
CH Mach 1 Plus Joystick PC	Virtual Reality		£24.95
CH Mach 3 Joystick PC	Virtual Reality		£34.95
CH Jetstick PC	Virtual Reality		£19.95
CH Gamestick PC Analogue	Virtual Reality		£34.95
CH Gamestick 3D USB	Virtual Reality		£59.95
CH F16 Flight Stick PC	Virtual Reality		£24.95
CH F16 Combat Stick PC	Virtual Reality		£76.95
CH F16 Fighter Stick PC	Virtual Reality		£119.95
CH F16 Fighter Stick USB	Virtual Reality	Due Summer 2000	£TBA
CH Force FX (Force Feedback Joystick)	Virtual Reality		£129.95
CH USB F16 Combatstick	Virtual Reality		£99.95
CH Pro Throttle USB	Virtual Reality	Due Summer 2000	£TBA
CH Pro Throttle PC	Virtual Reality		£119.95
CH Gamepad USB (Clear or Black)	Virtual Reality		£36.95
CH Joystick Switchbox PC	Virtual Reality		£32.95
CH Gamecard GC3 (PC)	Virtual Reality		£34.95
CH Trackball Pro (PS2 or Serial)	Virtual Reality		£89.95
CH X Cable (PC Extension Cable)	Virtual Reality		£11.95
CH EXL500 Race System	Virtual Reality		£71.95
Cyborg 2000 Joystick	Saitek		£39.99
Cyborg 3D Stick	Saitek		£49.95
ACM Game Card PC	Thrustmaster		£29.99
Cyborg 3D Stick USB PC	Saitek		£49.99

PEDALS

Product	Manufacturer	Price (RRP)
CH Pro Rudder Pedals PC	Virtual Reality	£99.95
CH Pedals	Virtual Reality	£53.95
CH Pro Rudders USB	Virtual Reality	TBA
CH Pedals USB	Virtual Reality	TBA
MRVC Rudder Pedals	RC Simulations	£119.95
Cirrus Rudder Pedal Set PC	Precision Flight Controls	$384.99
SIMPED-Vario Pedals PC	Hofmann Electronics	$139.99

STANDALONE SIMULATIONS

Developer	Publisher/Distributor	Product	Price (RRP)	PC Pilot Rating
Xavius	RC Simulations	Air Traffic Control Centre	£TBC	Await Review
Digital Integration	Titus	F/A 18	£34.99	3
SSI	Mindscape	Flanker 2.0	£34.99	4
Looking Glass	Electronic Arts	Flight Unlimited 3	£34.95	4
TRI	Take 2	Fly!	£34.95	3
Wilco	Associates	Hangsim	£29.95	4
Digital Aviation	Due year 2000	Light Aircraft Simulator 6	£TBC	Not Released
Microsoft	Microsoft	Microsoft Combat Simulator	£39.99	4
Microsoft	Microsoft	Microsoft Flight Simulator 98	£39.99	4
Microsoft	Microsoft	Microsoft FS2000 (Professional)	£69.95	4
Microsoft	Microsoft	Microsoft FS2000 (Standard)	£49.95	4
Oddsoft	Oddsoft	Rant 200	£89.95	Await Review
Apollo	RC Simulations	Tower Controller	£44.95	Await Review
Janes	Electronic Arts	USAF	£39.99	4
Laminar Research	Laminar Research	Xplane	£109.95	4

COMBAT FLIGHT SIMULATOR ADD-ONS

Developer	Publisher/Distributor	Product	Price (RRP)	PC Pilot Rating
Abacus	Contact Sales	3 Great Planes Gold Box (F4U-5 Corsair, P-51 Dakota Kid Mustang, Spitfire)	£14.95	2
Abacus	Contact Sales	Aircraft Animator	£29.99	4
Combat Zone	Associates	Combat Pilot No.1 (Attack) Squadron	£19.99	4
Abacus	Contact Sales	Flight Deck Blue Angels	£29.99	3
Wilco	Associates	Grand Canyon Scenery	£24.99	4
Combat Zone	Associates	Pacific Combat Pilot	£24.95	4
Abacus	Contact Sales	Pacific Theatre Aircraft	£29.99	4
Associates	Associates	Royal Air Force 2000	£24.95	4
Mailsoft	RC Simulations	Swiss Military 2000	£29.95	Await Review
Associates	Associates	The Luftwaffe Collection	£24.99	5
Abacus	Contact Sales	Tuskegee Fighters	£TBC	Not Released
Abacus	Contact Sales	Wings Over China	£29.99	3

We're on the web at www.rcsimulations.com

R.C Simulations

The Hangars,
Bristol International Airport,
Lulsgate, Bristol,
BS48 3EP, United Kingdom.

Tel: 0044 (0)1275 474550
Fax: 0044 (0)1275 474855
Email: sales@rcsimulations.com

The Product Listings section is kindly sponsored by RC Simulations, the UK's leading supplier of flight simulation equipment and software.

RC are one of the oldest established flight sim companies and offer a friendly, expert service.

They are able to supply any of the products listed here to anywhere in the world – often at a discount to the price seen above. So if you are looking for the latest release or a hard-to-find piece of hardware, give them a call!

Send RC Simulations this form with an A5 SAE (to the address shown on the left) for our free colour newsletter & pricelist . Alternatively view our website at www.rcsimulations.com and join our email news list.

NAME

ADDRESS & POSTCODE

FLIGHT SIMULATOR ADD-ONS

Developer	Publisher/Distributor	Product	Flight Simulator Compatibility	Price (RRP)	PC Pilot Rating
Abacus	Contact Sales	3 Great Planes - Caravan, Twin Otter, Cherokee	FS2000	£14.95	2
Abacus	Contact Sales	3 Great Planes - F4U-5 Corsair, P-51, Spitfire	FS2000	£14.95	2
Data Becker	Data Becker	747	FS98 only	£19.99	2
AETI	RC Simulations	737 Aircraft & Panel	FS98. Partial FS2000	£14.99	2
Flight One	Associates	747-400 Jumbo	FS98 and FS2000	£19.99	3
Associates	Associates	Aces High	FS98 only	£24.99	3
Apollo	RC Simulations	Adventure 2000	FS98 only	£39.99	3
Data Becker	Data Becker	African Safari Scenery	FS98 only	£19.99	2
Pilots	Associates	Airbus 2000	FS98 and FS2000	£24.99	3
Abacus	Contact Sales	Aircraft Animator	FS98 and FS2000	£29.95	4
Abacus	Contact Sales	Aircraft Factory 99	FS98 and FS2000	£34.99	3
Aerosoft	Associates	Airline Adventures	FS98 only	£9.99	2
Aerosoft	Associates	Airline Flights 2	FS98 and FS2000	£29.99	2
Abacus	Contact Sales	Airport & Scenery Designer V2.0	FS98 and FS2000	£34.99	3
Wilco	Associates	Airport 2000 Volume 1	FS98 and FS2000	£29.99	4
Wilco	Associates	Airport 2000 Volume 2	FS2000	£29.95	4
Papa Tango	Papa Tango	Austria Professional	FS98 only	£29.95	4
Peak	Associates	Australia Scenery	FS98. Partial FS2000	£19.99	2
Mailsoft	RC Simulations	Balaeric Islands Scenery	FS98. Partial FS2000	£29.95	Not Rated
Aerosoft	RC Simulations	Berlin 2000	FS98 and FS2000	£TBC	3
Aerosoft	Associates	California Adventure Collection	FS98 only	£24.99	3
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Associates	Associates	Concorde SST	FS98. Partial FS2000	£24.99	4
Abacus	Contact Sales	Custom Panel Designer	FS98 and FS2000	£29.99	3
Abacus	Contact Sales	Dangerous Airports	FS98 and FS2000	£29.99	3
Associates	Associates	DC-3	FS98. Partial FS2000	£9.99	4
Papa Tango	Papa Tango	EFIS'98	FS98 only	£39.99	4
VIP	Associates	Electra!	FS98. Partial FS2000	£29.99	3
Alting	Associates	Europe 1 Pro	FS98. Partial FS2000	£34.99	3
Alting	Associates	Europe 3 (England & Wales)	FS98. Partial FS2000	£29.99	3
Associates	Associates	Final Approach 2000	FS2000	£29.95	Not Released
Apollo	RC Simulations	First Class Boeing 747-400 Glass Cockpit	FS98 only	£34.99	3
Papa Tango	Papa Tango	Flight Academy	FS98. Partial FS2000	£34.99	2
Abacus	Contact Sales	Flight Deck Blue Angels	FS98 and FS2000	£29.99	3
Flight One	Associates	Flight Director 2000	FS2000	£29.99	Not Released
Flight One	Associates	Flight Director'99 Pro v2	FS98 and FS2000	£29.99	4
Papa Tango	Papa Tango	Fly Lauda	FS98 only	£34.95	2
Flight One	Associates	FS Clouds 2000	FS2000 only	£29.99	Not Released
Flight One	Associates	FS Clouds & Textures Pro	FS98 only	£29.99	4
Abacus	Contact Sales	FS Flightbag	FS98 and FS2000	£19.99	3
Lago	Associates	FS Traffic	FS2000	£19.99	5
Flight One	Associates	FS Weather	FS98 only	£19.99	3
Aerosoft	RC Simulations	German Airports 3	FS98 and FS2000	£29.99	4
Wilco	Associates	Grand Canyon Scenery	FS98. Partial FS2000	£24.99	4
Mailsoft	RC Simulations	Greece Scenery	FS98. Partial FS2000	£29.95	2
Flight Crew	Associates	Himalayas Scenery	FS98. Partial FS2000	£9.99	3
Instant Access	Associates	Hong Kong'99	FS98. Partial FS2000	£9.99	2
Mailsoft	RC Simulations	Hungary, Slovakia and Czech Republic	FS98. Partial FS2000	£29.95	3
Abacus	Contact Sales	Instant Airplane Maker	FS98 and FS2000	£29.99	4
Flight Crew	Associates	Japanese Aircraft Collection	FS98. Partial FS2000	£9.99	3
Flight One	Associates	Legendary Aircraft Collection	FS98 only	£19.99	4
Take 2	Take 2	Mayday! Mayday!	FS98 only	£24.99	2
AETI	RC Simulations	MD-83 Aircraft & Panel	FS98. Partial FS2000	£24.99	3
PC Aviator	RC Simulations	Megascenery Downunder	FS98. Partial FS2000	£39.95	3
PC Aviator	RC Simulations	Pacific Northwest Megascenery	FS98. Partial FS2000	£39.95	3
Instant Access	Associates	Perfect Flight Deluxe Great Britain/Ireland	FS98. Partial FS2000	£24.99	3
Associates	Associates	Precision Pilot	All sims	£34.99	4
Abacus	Contact Sales	Private Pilot	FS2000 only	£29.95	Not Released
AETI	Associates	Proflight 2000	FS98 and FS2000	£34.99	Not Released
AETI	Associates	ProFlight 98	FS98 only	£34.99	5
Associates	Associates	RAF Collection	FS98. Partial FS2000	£24.99	3
Papa Tango	Papa Tango	Real ATC	FS98 only	£39.99	4
Associates	Associates	Royal Air Force 2000	FS98 and FS2000	£24.95	Not Released
Mailsoft	RC Simulations	Scandinavia	FS98. Partial FS2000	£29.95	3
Flight Crew	Associates	Scenery Venice	FS98. Partial FS2000	£9.99	3
Flight Crew	Associates	Scenery Vienna	FS98. Partial FS2000	£9.99	3
Jeppesen	Associates	SimCharts	All sims	£19.99-29.99	5
Data Becker	Data Becker	Special Air Mission	FS98	£19.99	2
Flight Crew	Associates	Sri Lanka Scenery	FS98. Partial FS2000	£9.99	2
Wilco	Associates	Tahiti Scenery	FS98. Partial FS2000	£24.99	3
AETI	RC Simulations	The Jet Age	FS98 only	£19.99	2
Associates	Associates	The Luftwaffe Collection	FS98 and FS2000	£24.99	5
AETI	RC Simulations	The Next Generation (Aircraft)	FS98 only	£14.99	3
Lago	Papa Tango	The Triangle	FS98 only	£34.99	4
FlightSoft	RC Simulations	Tribute to the DC-10	FS98. Partial FS2000	£29.99	3
Pilots	Associates	Tupolev TU-154	FS98. Partial FS2000	£19.99	2
Mailsoft	RC Simulations	Turkey & Cyprus	FS98. Partial FS2000	£29.95	2
VIP	Associates	VIP Classic Airliners 2000 Edition	FS98 and FS2000	£24.99	New Version
VIP	Associates	VIP Classic Wings (vol 2)	FS98. Partial FS2000	£24.99	4
VIP	Associates	VIP Classic Wings 98	FS98. Partial FS2000	£19.99	4
VIP	Associates	VIP Ultimate Classic Wings	FS98. Partial FS2000	£29.99	4
Lago	Associates	Winplanner Plus	FS98 only	£34.99	3

FLIGHT YOKES

Manufacturer	Distributor	Price (RRP)
CH USB Flight SimYoke (Three Levers)	Virtual Reality	£149.95
CH USB Flight SimYoke LE (One Lever)	Virtual Reality	£119.95
CH Flight Sim Yoke PC (One Lever)	Virtual Reality	£104.95
AETI Yoke & Throttle	RC Simulations	£399.95

CONTROL PANELS & COCKPIT SYSTEMS

Manufacturer	Distributor	Price (RRP)
ACP Panel Compact	RC Simulations	£199.95
Optivision Visual Display System	RC Simulations	From £2999.95
Masterpilot Value Pack	RC Simulations	£39.95
Pro Quality Fresnel Lense & Fittings	RC Simulations	£99.95

Glossary

The world of aviation seems blessed with a bewildering array of acronyms. We hope the following will prove a handy reference guide to some of the more widely used terms.

A

ACARS - Aircraft Communication Addressing and Reporting System
ADF - Automatic Direction Finder/Finding
ADI - Attitude Deviation Indicator
ADR - Accident Data Recorder
AFCS - Automatic Flight Control System (an advanced autopilot)
AFIS - Aerodrome Flight Information Service
AGL – Above Ground Level
AHRS - Attitude-Heading Reference System
AIS - Aeronautical Information Service. CAA unit based at London-Heathrow Airport, providing flight-planning services and information for pilots
AIZ - Aerodrome Information Zone
AOPA - Aircraft Owners and Pilots Association
A/P - Airport or Autopilot
APP - Approach (control)
APU - Auxiliary Power Unit
ASI - Airspeed Indicator
ASR - Altimeter Setting Region
ATC - Air Traffic Control
ATIS – Automatic Terminal Information Service

B

BRG – Bearing

C

CAA – Civil Aviation Authority – the UK aviation regulatory organisation
CAS - Calibrated Airspeed
CAT - Clear-Air Turbulence
CDI - Course Deviation Indicator
CDU - Control Display Unit
CH - Compass Heading
CHT - Cylinder Head Temperature (a cockpit gauge)
C/L - Centre-Line (of a runway, for example)
Clouds - commonly-used abbreviations for cloud types:-
* AC - altocumulus
* AS - altostratus
* CB - cumulonimbus
* CC - cirrocumulus
* CI - cirrus
* CS - cirrostratus
* CU - cumulus
* NS - nimbo stratus
* SC - stratocumulus
* ST - stratus

CRT - Cathode Ray Tube (television monitor)
CRS – Course
CSU - Constant-Speed Unit
CTA - Control Area
CTR - Control Zone
CVR - Cockpit Voice Recorder
CZ - Control Zone (USA)

D

DF - Direction-Finding
DH - Decision Height
DI - Direction Indicator
DME - Distance-Measuring Equipment

E

EADI - Electronic Attitude Director Indicator
ECU – Environmental Control Unit
EFAS - Electronic Flash Approach Light System
EFIS - Electronic Flight Instrument System
EGT - Exhaust Gas Temperature (a cockpit gauge)
EHSI - Electronic Horizontal Situation Indicator
EICAS - Engine Indicating and Crew Alerting System
ELT - Emergency Locator Transmitter

F

FAA - Federal Aviation Administration, USA equivalent of UK CAA
FADEC - Full-Authority Digital Engine Control
FAF - Final Approach Fix
FDR - Flight Data Recorder more popularly known as the `black box'
FL - Flight Level
FMS - Flight Management System. Also referred to as FMC (Flight Management Computer)

G

GCA - Ground-Controlled Approach
GNSS - Global Navigation Satellite Systems
GPS - Global Positioning System (Navstar)
GPWS - Ground Proximity Warning System
GS - Glideslope
G/S - Groundspeed

H

HDG - Heading
HF - High-Frequency band
HSI - Horizontal Situation Indicator
HUD - Head-Up Display

I

IAS - Indicated Airspeed
ICAO - International Civil Aviation Organisation (responsible for the codes for airports amongst other things)
IFCS - Integrated Flight Control System
IFR - Instrument Flight Rules
IGS - Instrument Guidance System
ILS - Instrument Landing System
INS - Inertial Navigation System
IR - Instrument Rating
ISA - International Standard Atmosphere
ITT - Inter-Turbine Temperature

K

KHz – Kilohertz
Kt - Knot - one nautical mile per hour. One knot equals 1.1515 mph
kW - Kilowatt

L

LARS - Lower Airspace Radar Advisory Service
LAT - Latitude
LDA - Landing Distance Available
LF – Low Frequency - radio waves with frequencies in the 30-300 kHz band
LITAS - Low-Intensity Two-colour Approach System
LOC - Localizer
LON(G) – Longitude

M

M or MAG – Magnetic
Mach - Ratio of true airspeed to the speed of sound. Mach 1 = 1,100 feet per second or 760 mph
MAP - Missed Approach Point
MB - Millibar
MDA - Minimum Descent Altitude
MDH - Minimum Descent Height (above ground level)
MET - Meteorology, weather
METAR - Coded aerodrome MET report
MF - Medium Frequency
MFD - Multi-Function Display
MH - Magnetic Heading
MHz - Megahertz
MLS - Microwave Landing System
MSA - Minimum Safe Altitude
MSL - Mean Sea Level
MTOW - Maximum Take Off Weight
MZFW - Maximum Zero Fuel Weight

N

NATS - National Air Traffic Services
NDB - Non- Directional Beacon
NM - Nautical Mile
NOTAM - Notices to Airmen

O

OAT - Outside Air Temperature
OBS - Omni-Bearing Selector, used to select the radial from a VOR

P

PAPI - Precision Approach Path Indicator
PAR - Precision Approach Radar
PIC - Pilot-In-Command
PIO - Pilot-Induced Oscillation
PLN - Flight-Plan
PMS - Performance Management System
POB - Persons On Board. See also SOB
POH - Pilot's Operating Handbook, an aircraft's `owner's manual'
Pooley's - Flight guide to the United Kingdom and Ireland, published annually
PPL - Private Pilot's Licence
PTT - Press-To-Transmit

Q

QDM - Magnetic bearing to a direction-finding station
QDR - Magnetic bearing from the station
QFE - Atmospheric pressure at aerodrome elevation
QFU - Magnetic orientation of runway in use
QNE - Reading in feet on an altimeter set to 1013
QNH - Altitude above mean sea level based on local station pressure
QTE - True line of position from a direction-finding station
QUJ - True bearing

R

RAS - Radar Advisory Service
RCL - Runway Centre-Line
RBI - Relative Bearing Indicator, displaying information from the ADF
RDO - Radio
RIS - Radar Information Service
RMI - Radio Magnetic Indicator
RMU - Radio Management Unit
RVR - Runway Visual Range
RWY - Runway
RX - Receiver

S

SAS - Stability Augmentation System
SB - Service Bulletin
SELCAL - Selective Calling
SFC - Specific Fuel Consumption
SID - Standard Instrument Departure
SOB - Souls On Board (see also POB)
SOP - Standard Operating Procedure.
SR - Sunrise
SRZ - Special Rules Zone
SRA - Surveillance Radar Approach
SRE - Surveillance Radar Element of a GCA
SS - Sunset
SSB - Single Sideband
SSR - Secondary Surveillance Radar
STAR - Standard Terminal Arrival Route, for inbound IFR traffic
STOL - Short Take-Off and Landing

T

TACAN -Tactical Air Navigation System
TAF - Terminal Area Forecast
TAS - True Air Speed
TCA - Terminal Control Area (USA)
TCAS - Traffic Alert and Collision Avoidance System
THR or Thld. - Threshold
TMA - Terminal Control Area (UK)
TO - Take- Off (sometimes TKOF)
TODA - Take- Off Distance Available
TODR - Take- Off Distance Required
TORA - Take- Off Run Available
TSO - Technical Standard Order
TVOR - Terminal VOR
TWR - Tower (aerodrome control tower)
TWY - Taxiway
TX - Transmitter

U

UDF - UHF Direction Finding
UHF - Ultra-High Frequency
UIR - Upper Information Region
UTC - Co-ordinated Universal Time, (Greenwich Mean Time)

V

VAL - Visual Approach and Landing (chart)
VAR - Variation (magnetic)
VASIS - Visual Approach Slope Indicator System
VDF - Very-High Frequency Direction-Finding
VFR - Visual Flight Rules
VHF - Very H igh Frequency
VIS - Visibility
VLF - Very Low Frequency
VOLMET - Continuous recorded broadcasts of weather conditions
VOR - Very high frequency Omni-directional Range
VP - Variable-Pitch (propeller)
VRP - Visual Reporting Point
VSI - Vertical Speed Indicator

W

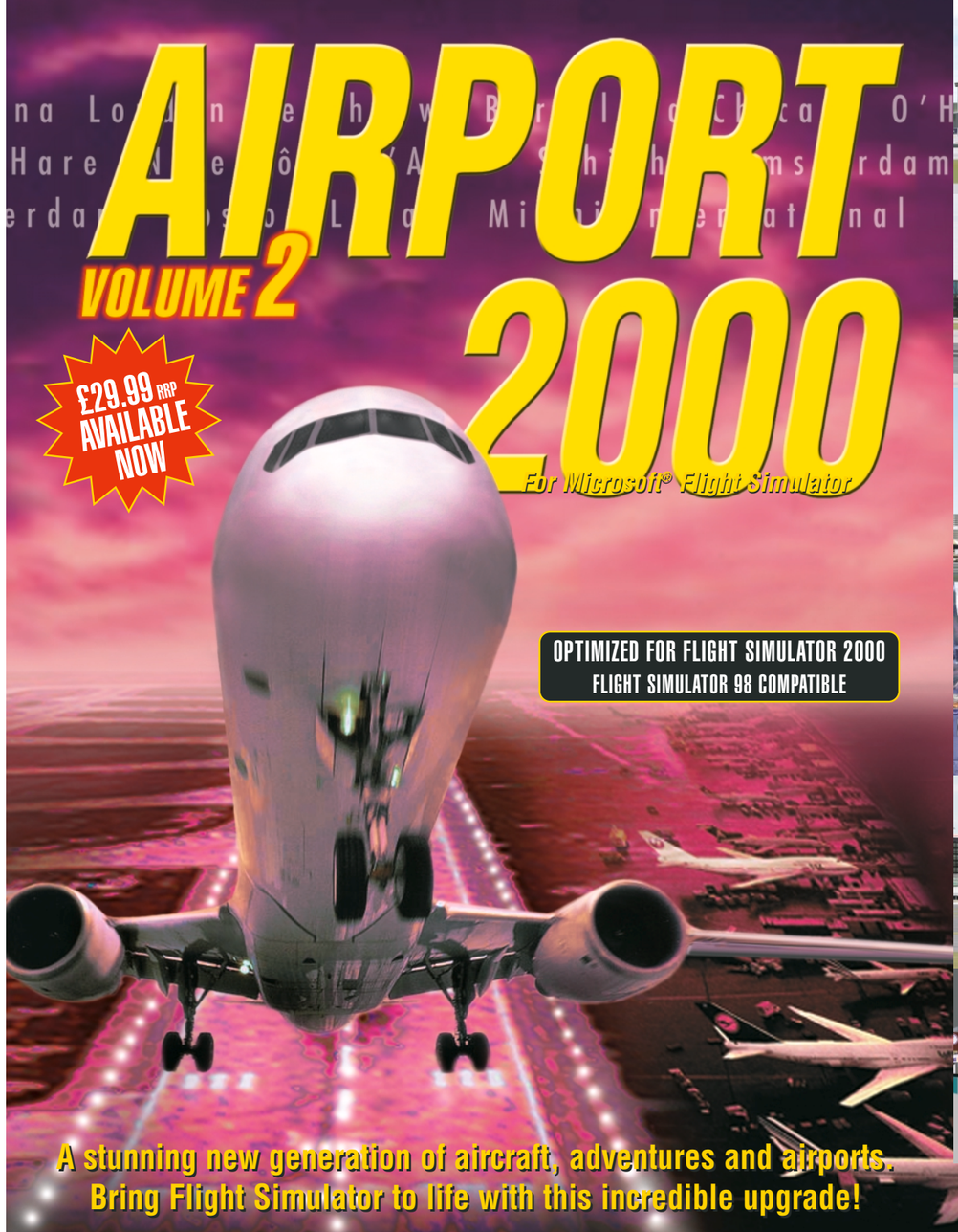
WP - Waypoint
WX NIL - No significant weather, term used in Met reports

X

XMSN - Transmission
XPDR - Transponder

Z

ZFW - Zero-Fuel Weight - maximum permissible weight of an aircraft
ZULU or Z - Used worldwide for times of flight operations (same as UTC)



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